Nebraska GIS Steering Committee

Annual Report
November 1998

Coordinating the Implementation of GIS Technology at the State and Local Government Level

NEBRASKA GEOGRAPHIC INFORMATION SYSTEMS STEERING COMMITTEE

ANNUAL REPORT

NOVEMBER 1998

Compiled by

Larry K. Zink

Coordinator, GIS Steering Committee

Executive Summary

Annual Report, November 1998
Nebraska Geographic Information Systems Steering Committee

In this annual report, the Nebraska GIS Steering Committee provides an overview of its activities and some of the significant GIS-related initiatives that have been undertaken during the last sixteen months. As an intergovernmental coordinating body, created by the Legislature in 1991, the GIS Steering Committee seeks to ensure that public investments in GIS technology are achieved in a coordinated, efficient manner. Included in this report, are highlights and background information on the Nebraska GIS Steering Committee's efforts in the following areas.

What is Geographic Information and GIS. Over the past year, there has been a considerable amount of public policy discussion related to the importance of coordinating the use of information technology in government. Because GIS is an increasingly popular component of government information technology, this report provides a brief overview of what is meant by geographic information and Geographic Information Systems (GIS). As part of this overview, a range of GIS applications are outlined and some of the benefits of GIS are highlighted.

Role of the GIS Steering Committee and Need for Additional Support. GIS is a technology that offers the potential to integrate a wide array of information and to reduce the need for costly duplication of effort in the development and maintenance of databases. To realize these potentials, it is important that public investments in GIS technology are based on a solid understanding and are well planned. This report outlines the role of the GIS Steering Committee in helping to encourage sound public investments in this technology and the need for additional resources to enable the Steering Committee to address important, unmet needs in this area.

Education and Outreach Activities. Education is one of the most powerful tools that the GIS Steering Committee has to achieve its coordination role. Outreach and education is particularly important in relationship to local government officials. This report provides an overview of several education efforts and highlights the need for additional resources in this area.

Review of GIS-related Agency Budget - Technology Plans. As part of the new information technology coordination initiatives enacted by the Legislature in 1998, the GIS Steering Committee cooperated with the Nebraska Information Technology Commission and Chief Information Officer to review GIS-related agency technology plans. This report includes the Steering Committee's recommendations on those agency plans submitted to it for review.

Development of Priority Databases. One of the most cost-effective areas of GIS coordination is in the development and maintenance of commonly used geospatial databases. This report outlines which databases, because of their wide spread use, have been prioritized for development. The report also provides an update on database development efforts and intergovernmental planning efforts related to future development, maintenance and distribution of priority databases.

Facilitating Local Government Land Record Modernization. The modernization of how land records are maintained at the local government level, is one of the most promising areas for future GIS application. The report outlines several initiatives designed to facilitate this local government modernization. Among these initiative reports is a preliminary report on a pilot project to develop a Public Land Survey System (section corners) database for counties and an effort to develop a Guidebook for Local Government Multipurpose Land Information Systems.

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INTRODUCTION

The Geographic Information System Steering Committee was established by the Legislature in 1991 *(Reissued Revised Statutes of Nebraska, 1943, §81-2601 through §81-2605, Appendix A),* in an effort to coordinate the implementation of GIS technology by state and local government in Nebraska. Geographic Information System (GIS) is a powerful information technology that has numerous applications in both the public and private sectors. The role of the Steering Committee is to see that public investment in GIS technology is achieved in a coordinated efficient manner.

In 1998, the Nebraska Legislature revised the statutes related to the GIS Steering Committee. These revisions added three new members to the Steering Committee and changed the date for this Annual Report. In addition, the Steering Committee was assigned the responsibilities of assisting and reporting to the new Chief Information Officer and of assisting the technical panel of the Nebraska Information Technology Commission.

Since its creation in 1991, the GIS Steering Committee has submitted six earlier Annual Reports to the Legislature (July 1992, 1993, 1994, 1995, 1996 and 1997) and two Interim Planning Reports (December 1993 and December 1994). This report is submitted to the Governor, the Clerk of the Legislature, the Nebraska Intergovernmental Data Communications Advisory Council (NIDCAC), and Nebraska's Chief Information Officer, as required by the statute.

GIS Steering Committee Priorities. In January of 1998, the GIS Steering Committee adopted five long-range goals as part of a strategic planning process to guide its efforts over the next several years. This report provides an overview of recent GIS Steering Committee activities in these general areas and an outline of the initiatives currently underway or planned. The long-range goals adopted by the Steering Committee in January 1998 are as follows:

- **Priority Database Development.** Actively coordinate the development, maintenance, and distribution of priority statewide digital geospatial databases.
- **Land Record Modernization.** The promotion and facilitation of local government land record modernization and GIS development.
- **GIS Education Efforts.** Strengthen the GIS Education Subcommittee and its overall educational program activities.

- **Strengthen Internal Organizational Structure.** Evaluate the GIS Steering Committee's operational process and structure.

- **Increase Support for GIS Steering Committee.** Increase financial support for the GIS Steering Committee goals and programs.

In addition to these items, this report also provides background information on some of the GIS-related public policy issues considered by the Steering Committee.

WHAT IS GEOGRAPHIC INFORMATION AND GIS

Within state and local governments, there are currently broad public policy discussions related to the importance of enhancing the overall coordination of information technology investments by government agencies. Within this context, the GIS Steering Committee believes it is important to include in this report a brief overview of geographic information and Geographic Information Systems (GIS), and the growing importance of this technology relative to government information management in general.

HOW DO GEOGRAPHIC INFORMATION AND GIS RELATE TO INFORMATION TECHNOLOGY IN GENERAL?

Geographic information is a significant subset of the information explosion that has occurred over the last two decades. In the broadest sense, geographic information is information that includes a spatial reference (street address, latitude/longitude, section/township) as part of the data records. According to the Urban and Regional Information Systems Association, more than 80 percent of all the information used by local governments is geographically (or spatially) referenced.

The geographic component of information has become increasingly important as information technologies, such as Geographic Information Systems (GIS), have been developed to analyze and display information based on its location. GIS is a computer-based tool that integrates the maps (spatial/graphical component) and database (tabular alpha-numeric component) aspects of information.

In general, the most effective and efficient GIS is one that is integrated with the rest of an organization's information technology (hardware, software and databases). A GIS adds a powerful package of tools to an organization's information technology capability because of its ability to integrate and analyze diverse types of information, based on the physical location or proximity of the various features or characteristics. The availability of GIS has placed an increased importance on the geographic component of information that governments collect and maintain.

Geography - An Increasingly Important Foundation for Referencing Information. As the volume and use of digital information has grown, society has required commonly understood reference bases or foundations with which to link and combine information. Several such information references or links have evolved over time. For example, in this country much information is now referenced and can be accessed by unique personal identifiers (the social security number, telephone number, etc.). In a similar vein, the growing use of geographically referenced information is now addressing the acknowledged need for an information referencing

scheme related to "space" or geographic location. This sense of "place" is becoming more important to our society and citizens.

Historically, we have defined location or place by a variety of methods (street address, post office rural route, zip code, section/township/range, county, latitude/longitude, etc.). When we automate the use of geographic information for the integration and analysis of data, some locational reference methods (i.e., latitude/longitude) are more adaptable than others (street addresses) for use within a GIS. As we rely more heavily on shared geographic information, issues such as the relative positional accuracy of our geographic information also become more important. The required positional accuracy of information varies with the application of that information. For many applications, rural routes address maybe sufficient. However, for E911 (emergency response) applications, a more exact address is desired. When mapping buried utility cables and pipelines, an even greater degree of accuracy is needed. In automating the use of geographic information, it is important to develop and implement standards for collecting and recording this geographic information. These standards are important not only within a given organization, but also across organizations, as we seek to gain efficiency and provide improved service by sharing information between organizations.

WHAT ARE THE APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS?

Geographic information systems were initially developed primarily for use in the area of natural resources management. However, as the software's capabilities and the understanding of the technology has grown, the use of GIS has now expanded to include a wide and rapidly growing range of applications. Some of the more common areas of government/public applications of GIS include the following:

- Assessment
- Planning and zoning
- Natural resources management
- Transportation planning and maintenance
- Health and public safety
- Utilities planning and service
- Economic development
- Disaster planning and response
- Apportionment (school, fire, legislative districts)
- School bus and other routing

In all of these applications, the location of some features or characteristics in relation to other features is an important consideration. A GIS allows a user to associate this feature location information with other types of information that are important relative to the particular application. For example, in both assessment and natural resources management applications the location of soil types relative to property parcels is an important consideration. In planning and zoning applications, the location of animal confinement facilities relative to residential areas might be considered important. In public safety applications, the spatial pattern of crimes or accidents may provide an important clue for solving outstanding crimes or preventing future crimes or accidents. In most of these applications, the bulk of the information is collected and stored via traditional information technology. It is the GIS and the geographic component of the information, which is collected and referenced in a consistent manner, which facilitates the consideration of the spatial component of the information.

WHAT ARE THE ADVANTAGES OF GEOGRAPHIC INFORMATION SYSTEMS?

Many of the advantages of a GIS are unique to particular applications. However there are several general advantages that a GIS offers public agencies and institutions.

- **Integration of Different Types of Data Based on Location.** A GIS provides the capability to bring together different types of information based on their proximity and to explore their interaction. For example, in researching ground water quality issues, information can be brought together on soil type, depth to ground water, fertilizer usage, cropping patterns, and irrigation usage to model the impact of irrigated, fertilized crops on ground water quality in a given area.

- **A Picture is Worth a Thousand Words.** The ability of a GIS to graphically display (map) different features or characteristics, relative to their location, is a valuable tool in making an overall assessment of the implications of a particular set of information for public policy decisions or program planning.

- **Recording Changes and Keeping Maps and Records Current.** The active link that a GIS allows between databases and maps greatly facilitates the maintenance of mapped information on dynamic features such as property parcels, etc. For example, with a GIS a County Assessor can, with relative ease, update a property parcel map with new information on an easement for a buried cable and tie that back to a database with the owner's information.

- **Enhanced Analytical Capabilities.** A GIS provides a user with new enhanced analytical capabilities that would be difficult, if not impossible without this technology. For example, with the proper geographically referenced information, a GIS can very quickly determine which emergency unit should respond to an E911 (Emergency 911) call from a particular telephone number and the fastest route to take during rush hour traffic.

- **Facilitates Sharing of Information among Multiple Users.** GIS facilitates the sharing and integration of geographically referenced information among multiple agencies or users. There are many applications that require common types of data (highways, streams, property parcels, etc.). A coordinated approach to GIS development would reduce the costs associated with the duplication of data development and maintenance by having one entity responsible for the development of a given type of data for a given area. This also has another benefit in that different public entities and agencies would be making and implementing public policy on the same information.

AN EXAMPLE ¾ BENEFITS FOR A COUNTY ASSESSOR

While the above list outlines some of the more general advantages and benefits of GIS, a closer look at one specific area of application (assessment) provides a more detailed perspective of the benefits an assessor might expect from the technology. Because of the potential benefits of this technology, the GIS Steering Committee anticipates investments in local government and assessment-related applications of GIS will grow significantly over the next several years. If these technology investments are carefully implemented, they will assist County Assessors in the performance of their duties, as well as numerous other local and state agencies.

While GIS technology offers many benefits and tools to an assessor, it is important to note that it is not a replacement for a Computer Aided Mass Assessment (CAMA) program. GIS, if

developed carefully, can be integrated with a CAMA program and enhance overall assessment efforts. Among the benefits and tools that a GIS offers a County Assessor are the following.

- **Inventory of Parcels on Tax Rolls.** Because of its graphical component, a GIS is powerful tool to ensure that all property parcels are currently included on the tax rolls.
- **Integrating Multiple Factors for Valuation.** GIS provides tools to directly assist the assessment process by integrating a variety of factors that might influence value. Some of the key characteristics which can be associated with a property through their spatial relationship with that property are as follows:
  - soils
  - comparable sales within a given distance
  - zoning
  - water, streams, and flood plains
  - area or size
  - land use
- **Utilizing Spatial Relationships in Equalization Analyses.** For example, a properly configured GIS could, with relative ease, select all the property parcels within a 20 miles radius of a given point that are of a certain area, soil type, level of water development, and sold within a specified period.
- **Reduce the Number of Tax Protests.** The ability of GIS technology to provide a graphic, visual display of the characteristics (such as soil type, size, comparable value, etc.) that were used to determine the valuation for a given property parcel reduces the likelihood that an owner will file a tax protest.
- **Updating and Maintaining Property Parcel Maps.** Once such maps have been carefully developed initially within a GIS, current, accurate parcel maps can be maintained with relative ease and modest expense.
- **Easier Retrieval and Display of Property Information.** A considerable amount of time is spent in an assessor's office performing the repetitive tasks involved in retrieving information related to property parcels. A GIS provides excellent tools to facilitate these tasks.
- **Common Assessment, Equalization and Mapping Procedures Statewide.** The development of standards and guidelines for GIS implementation for assessment purposes could provide a vehicle for the evolution of more uniform assessment, equalization and property parcel mapping procedures statewide — at both the local and state level.
- **Provide Policy Makers with Insights on Implications of Policy Decisions.** The ability of a GIS to graphically display the results (or potential results) of policy decisions related to assessment and tax policy provides policy makers with valuable tools to model and visualize the implications of policy decisions.
- **Cooperative Development and Maintenance of Property Ownership Maps and Records.** Property parcel maps, and related information about land ownership, are needed by multiple local, state, and federal agencies for a wide variety of applications. Currently many agencies maintain separate property parcel maps, resulting in a poor utilization of public funds through duplication of efforts and policy making based on conflicting information. Examples of some of the applications needing property parcel data are listed below.
  - Assessment
  - Natural resources management
  - Farm planning
  - Transportation planning and maintenance
  - Public safety
  - Planning and zoning
  - Utilities planning and service
  - Economic development
  - Disaster planning and response

ROLE OF GIS STEERING COMMITTEE AND NEED FOR ADDITIONAL SUPPORT

Nebraska statutes charge the GIS Steering Committee with making recommendations for program initiatives and funding. The statutes also charge the Steering Committee with establishing guidelines and policies for statewide GIS operation and management to include: databases, hardware and software, setting of standards, education, and general coordination of GIS development.

In a practical sense, the Steering Committee has focused its intergovernmental (state, local, and federal) coordination efforts on facilitating data sharing, coordination of joint database development, development of standards, and education. As the interest in GIS among government agencies has increased, the need for and importance of these outreach, education and coordination efforts has increased dramatically. As this report demonstrates, the Steering Committee is active in all of these areas.

Results with Limited Resources. As this report indicates, in spite of its limited resources, the GIS Steering Committee has managed to leverage these resources and those from other agencies, to achieve numerous accomplishments. The Steering Committee has established a Nebraska Geospatial Data Clearinghouse to serve as a central point to locate available geospatial data. The Steering Committee has sponsored major state and regional GIS conferences and GIS presentations at numerous other functions, and produces a regular state GIS newsletter. The Committee worked with the State Surveyors Office to develop a statewide network of three Global Positioning Satellite (GPS) Base Stations to assist state and local agencies in determining the coordinates of positions around the state. The Steering Committee is working with state and local agencies to develop guidelines for local government land information systems. The Committee is working with the State Surveyors Office and four counties on a pilot project to calculate the coordinates for the Public Land Survey System section corners.

The Steering Committee has established intergovernmental Advisory Committees on several priority statewide geospatial databases and also worked with member agencies to encourage and support several key statewide geospatial database development efforts. Particularly noteworthy among these is the joint effort by the Nebraska Natural Resources Commission (NNRC) and the US Geological Survey to develop Digital Orthophotography (digital aerial photographs); the joint effort by the U.S. Natural Resources Conservation Service, the NNRC, and the Conservation and Survey Division - UNL (CSD) to develop statewide digital county soil surveys; and the effort by the CSD to develop a statewide land cover database.

Funding Request. While the Steering Committee has made progress on several major goals, it is aware of vital education and coordination needs for which it lacks the resources to adequately address. Because of its lack of resources to meet these vital needs, the Steering Committee requested additional support from the Legislature in 1997, as part of the broader Nebraska Information Technology Coordination Initiative embodied in LB924. Because these unmet needs continue to grow and because additional resources were ultimately not included in that legislation, the GIS Steering Committee endorsed a similar request for funding at its July 21, 1998 meeting:

- $10,000 for travel and other operating costs of the Steering Committee and its subcommittees
- $40,000 for outreach, education, and coordination program funding
- $58,264 for increased human resources for outreach, education and coordination programs

WHAT ARE THE AREAS FOR WHICH ADDITIONAL SUPPORT IS NEEDED?

Basic Operational Support.

The Nebraska GIS Steering Committee currently operates with a budget of approximately $3,000 annually and the support of a Coordinator position provided through the Intergovernmental Data Services Division of DAS and funded by Information Management Services. The bulk of the $3,000 is expended to reimburse only two committee members for their travel across the state to participate in six meetings a year. The current funding level leaves no funding available to reimburse the other six non-state agency representatives on the Steering Committee, nor the non-state agency members of technical advisory committees who must travel across the state to provide input into those meetings. The Steering Committee is requesting an increase from the current $3,000 to $10,000 to provide for needed basic operational expenses such as travel, printing and mailings.

Funding for Outreach, Education, and Coordination Programs

To maximize the return from public investments in the development of geographically referenced databases, additional resources are needed for outreach and education of public officials. This need is particularly acute in relation to local governments. Local governments make substantial investments in mapping and aerial photography in the on-going course of fulfilling their areas of responsibility. For many county commissioners, county assessors, and agency directors these are new areas of expertise. Resources are needed to develop educational materials and plan and implement outreach and training programs. Public investments now in the education of public officials, will result in greater overall return from other public investments. The GIS Steering Committee has conducted limited efforts in this area, but the lack of program resources has severely handicapped this effort.

Development of Guidelines and Standards for Commonly Used Geographically Referenced Databases. To ensure that a geographically referenced database created by one public entity can be integrated with that created by another public entity, guidelines and standards need to be developed. In the development of these guidelines and standards, the needs of multiple agencies, at various levels of government, must be considered. For example, guidelines for digital property parcel mapping will make it more likely that a natural resource district can merge the property parcel maps developed by one county with those developed by an adjacent county. Such guidelines would allow the Department of Roads to use the digital county road maps created by multiple local governments to update those developed by their agency staff. Additional resources are need for this and other similar efforts. The current budget does not even provide the resources to reimburse advisory committee members for their travel across the state for meetings.

Interagency/Intergovernmental Data Development Coordination. Additional resources are also needed to work with public and private entities to encourage and facilitate joint geographically referenced data development efforts. In many instances, a major need is for someone to serve as the bridge to inform other entities of common interest in having a particular type of data developed for a given area. By facilitating this type of cost/resource sharing, key geographically referenced databases, that the individual partners would not have been able to undertake on their own, can be developed as a result of joint projects. Resources are needed for on-going outreach to state, federal, and local government agencies, and private industry to understand their data needs and to share that knowledge with others that might share those needs.

EDUCATION AND OUTREACH ACTIVITIES

The GIS Steering Committee's adoption of the following educational goal, as one of three long-range program goals, is a statement of its continued belief that educational outreach is one of its most important tools:

> *"**GIS Education Efforts.** Strengthen the GIS Education Subcommittee and its overall educational program activities."*

Resources Needed. The central role that unmet education and outreach needs played in the Steering Committee's requests for funding highlights the importance that the Steering Committee places on educational efforts. As noted above, resources are especially needed for outreach and education of public officials. This need is particularly acute in relation to local government. Local government officials are being called upon to make decisions on substantial investments in information technology in general, and computerized mapping and GIS in particular. For most of these officials, this is a whole new area of technology and expertise. If they make well-planned investments in computerized mapping and GIS, these investments can pay dividends to taxpayers for many years in terms of integrated applications and solid information upon which to base public policy. Without informed, well-planned investments in GIS, the databases created are much less likely to be suitable for a range of applications or for integration with other databases. It is primarily to address these critical unmet educational and outreach needs, that the Steering Committee has requested additional funding in the current budget cycle.

GIS Symposium. In spite of its limited resources, the GIS Steering Committee pursues several avenues to achieve its education and outreach goals. One of the most demanding and effective are GIS Symposiums. In 1998, the Nebraska GIS Steering Committee co-sponsored and hosted the Mid-America GIS Symposium, in Lincoln. This four-day, regional event was also sponsored by groups in six other states, and drew over 600 participants. These Symposiums provide forums for people and agencies currently active in GIS to learn from their counterparts in other agencies. These Symposiums also provide great opportunities for people new to GIS to get an introduction to the technology and to make contacts with others who have experience in the field. Much of the Nebraska leadership for hosting the Mid-American GIS Symposium in Lincoln was provided by the Conservation and Survey Division - UNL and Dr. James W. Merchant, in particular.

The GIS Steering Committee currently has an active committee that is planning a 1999 Nebraska GIS Symposium. Because these Symposiums require so much time and energy to organize, the GIS Steering Committee has also stated its support for the formation of a private, non-profit Nebraska GIS association. It is hoped that if there is sufficient support for such an initiative, such a group could ultimately take over the primary responsibility of organizing and hosting GIS conferences and symposiums.

NACO and Other Presentations. In addition to the GIS Symposiums, the Steering Committee attempts to provide presentations to a range of organizational meetings. For the last several years, the Steering Committee has provided a presentation booth and frequent program contributions at the Nebraska Association of County Officials Annual Conference. The Steering Committee also sponsors periodic GIS Forums to provide opportunities for members of the GIS user community to learn about other GIS efforts and to network with other GIS users. The Steering Committee also participates in forums

and meetings sponsored by other groups, such as the Nebraska Forum on Geospatial Information: Opportunities and Challenges, sponsored by the University of Nebraska. This type of education and outreach is limited primarily by available resources.

Nebraska GIS Update Newsletter. With the support of the Conservation and Survey Division - UNL and the Department of Roads, the GIS Steering Committee publishes at least three newsletter each year for the Nebraska GIS community. This newsletter has a circulation of approximately 1600. As the interest in GIS has grown across Nebraska, this newsletter is growing in importance as a vehicle to communicate with and bring together both the current GIS users and those who are just beginning to explore the technology.

In addition to the printed newsletter, the Steering Committee also provides Internet access to GIS-related reports and initiatives through its Internet home page located at: *http://www.calmit.unl.edu/gis/*. The Steering Committee also sponsors two Nebraska GIS-related Internet email discussion forums that are available through the home page. The GIS Steering Committee's home page and Internet discussion groups are provided courtesy of the Conservation and Survey Division - UNL.

REVIEW OF GIS-RELATED AGENCY BUDGET - TECHNOLOGY PLANS

Background. In 1998, as part of a statewide Information Technology Coordination Initiative, additional statutory responsibilities were added to the GIS Steering Committee for reporting to, assisting and advising the new Chief Information Officer (CIO) and the Nebraska Information Technology Commission (NITC).

Consistent with these new responsibilities, the GIS Steering Committee offered to assist the CIO, the Information Resources Cabinet (IRC), and the NITC with their review of the GIS-related information technology plans that were submitted along with 1999-2001 budget proposals. Based upon the positive responses received from these new information technology coordinating bodies, the GIS Steering Committee reviewed and made recommendations on the GIS-related technical plans that were forwarded to it for review.

In the past, the Steering Committee has determined that one of its most effective foci is in the area of geospatial databases. Consequently, the development of geospatial databases is an area that has received particular attention in the Steering Committee's review of these information technology plans. Geospatial databases are databases that incorporate specific locational reference information (i.e., latitude/longitude) for database elements. The development of these geospatial databases is the most costly component in the implementation of most GISs. With proper planning and coordination, many of these geospatial databases can serve the needs of many users (state, local and federal), and therefore save the costs of duplication (or near duplication) of effort.

The Nebraska GIS Steering Committee has reviewed and provided recommendations on several new GIS-related proposals from state agencies' information technology plans. However, in many cases these recommendations are based on general concepts only and very short timelines for review. To ensure that the GIS Steering Committee is able to effectively serve its coordination role in the area of geospatial data, it is important that state agencies that produce geospatial databases covering a sizable geographic area, communicate and coordinate with the GIS Steering Committee. To be effective, this communication needs to be early in the database-planning phase, as well as in the actual development phase. It is only through this early and on-going collaboration that the GIS Steering Committee can be effective in ensuring that the interagency details are considered in a way such that investment in geospatial databases will serve the largest number of needs. In this regard, it is important to note that an agency's coordination with the GIS Steering Committee is voluntary, and that the degree of on-going communication and coordination between agencies and the Steering Committee varies considerably.

The following recommendations of the Nebraska GIS Steering Committee are based on a system of recommendation categories developed in response to a request from the Nebraska Legislature and reported to the Legislature in a December 1993, Interim Planning Report. These recommendations fall into one of four categories:

- Highly recommended from an overall GIS implementation perspective,
- Recommended from a GIS utilization perspective,
- Neutral from a GIS utilization perspective (no recommendation), and
- Concerns and/or opposition expressed by the GIS Steering Committee from the perspective of overall GIS implementation.

Corn Development, Utilization and Marketing Board

NEUTRAL FROM A GIS UTILIZATION PERSPECTIVE (NO RECOMMENDATION)

Comments: The GIS Steering Committee is making no recommendation on the GIS-related proposal from the Corn Development, Utilization and Marketing Board. The Steering Committee did note that there was probably a need for additional study and analysis, and that expectations appeared to be very high relative to the requested resources. The Steering Committee also noted that several of the databases that were referred to in the proposal do not currently exist, and would need to be developed.

Oil & Gas Conservation Commission

RECOMMENDED FROM A GIS UTILIZATION PERSPECTIVE

Comments: The GIS Steering Committee supports efforts by the Oil & Gas Commission to reference their well locations by latitude and longitude coordinates, and urges them to coordinate this effort with the Steering Committee.

State Surveyor's Office

Comment: The GIS Steering Committee believes a formal recommendation is unnecessary because the State Surveyor's GIS-related initiatives do not represent new initiatives relative to the 1999-2001 budget. The Steering Committee strongly supports the State Surveyor's Office initiatives in the area of providing technical assistance, support, and advice to the various counties, cities, and other governmental bodies in Nebraska in their endeavors to produce and maintain cadastral and other geo-referenced maps. This relatively new effort was endorsed and funded by the Legislature in its last session and was endorsed by the GIS Steering Committee at that time.

Water Resources, Department of

HIGHLY RECOMMENDED FROM AN OVERALL GIS IMPLEMENTATION PERSPECTIVE.

Comment: The GIS Steering Committee highly recommends the Nebraska Department of Water Resources GIS project to digitize maps of water rights as well as other related information. Implementation of the proposal should increase agency efficiency as well as provide cost savings for Department of Water Resources constituents. It will be an asset to the state as it relates to interstate and intrastate water issues and will benefit state agencies which will be better able to effectively utilize Department of Water Resources information.

Natural Resources Commission - Soil Survey Digitization

HIGHLY RECOMMENDED FROM AN OVERALL GIS IMPLEMENTATION PERSPECTIVE.

Comment: The GIS Steering Committee highly recommends the Soil Survey Digitization effort as it has identified this statewide database as a priority for development for Nebraska. It is the GIS Steering Committee's understanding that the completion of this project by year 2003 is an optimist estimation, and that the project could take until at least 2007 to complete. These estimates depend upon resources that can be made available within NRC and by the other cooperating partners (USDA -Natural Resources Conservation Service and Conservation and Survey Division - UNL) over a period of years. It is the Steering Committee's understanding that NRC intends to redirect the equivalent of one additional FTE to this project and that the hardware and software requested will facilitate the involvement of additional staff in this effort and provide an additional server to help make this data available to the public.

Natural Resources Commission - Revise Digital Elevation Model from Level 2 to Level 3

RECOMMENDED FROM A GIS UTILIZATION PERSPECTIVE

Comment: The GIS Steering Committee noted that the Digital Elevation Model project and the DOQQ project are best considered as interrelated pieces of one project. The Steering Committee noted that DOQQs and DEMs are both national and Nebraska priority databases, and expresses its congratulations for NRC's planned completion of an initial statewide coverage of these databases next year. It is the Steering Committee's understanding that the DEM project will require the redirection of 1/2 to 1 equivalent existing FTEs and that the revised DOQQ project would require the redirection of up to 2 equivalent existing FTEs, depending upon the level of participation of USGS in these projects. The Steering Committee understands that it is likely that USGS will participate as a partner in this revision process, as they did in the initial development of DEMs/DOQQs. If USGS does participate in a similar manner as in the original development project, the $90,000 High Resolution Scanning System and the $80,000 for Photo Acquisition Costs will not be required. It is the understanding of the Steering Committee that the $90,000 scanner was not included as a proposed budget item for this project, because it is listed as a budget item for a NRC floodplain mapping project. That project was not review by the Steering Committee, as it was not listed as a new project. It is also the understanding that current plans do not include the use of Color Infra-red Photography ($110,000) for this project, and that this would only be considered if the additional costs for this option becomes available from another source and there is an interagency determination of the merits of color infra-red versus black and white DOQQs. The Steering Committee urges NRC to coordinate with the Steering Committee as it makes detailed decisions on this project.

Natural Resources Commission - Revise DOQQ database to 1999 NAPP

RECOMMENDED FROM A GIS UTILIZATION PERSPECTIVE

Comment: See the comment above on the Revised Digital Elevation Model.

Natural Resources Commission - Develop DRG Database

NEUTRAL FROM A GIS UTILIZATION PERSPECTIVE (NO RECOMMENDATION).

Comment: At this point, the GIS Steering Committee concurs with the statement made by Dayle Williamson, NRC Director, in his cover letter to the Budget Division, "The value to the state [of this effort] *will have to be fully considered and additional discussions will be necessary."*

Natural Resources Commission - Development of National Hydrography Database

HIGHLY RECOMMENDED FROM AN OVERALL GIS IMPLEMENTATION PERSPECTIVE.

Comment: It is the Steering Committee's understanding that this project would require the equivalent of one additional FTE. Whether this was a new or existing FTE would depend upon the FTE's needed for other projects. Currently no new FTE is being requested for this project. The Steering Committee noted that the hydrography database is both a national and Nebraska priority database. The Steering Committee also noted the interest in further development of this database by the Department of Water Resources, the Department of Environmental Quality, the Department of Roads, the Game and Parks Commission, and local political subdivisions. The Steering Committee urges NRC to coordinate with these agencies and the Steering Committee itself as planning for the enhancement this database moves forward.

The above recommendations were forwarded to the Chief Information Office, the Information Resources Cabinet, and the Nebraska Information Technology Commission. In addition to the GIS-related projects for which the GIS Steering Committee offered the above recommendations, technology plans for five other agencies were also forwarded to the GIS Steering Committee for review. Upon review, the Steering Committee determined that those agency technology plans did not appear to have new GIS-related projects in their plans, and therefore no recommendations were offered on those agency technology plans.

THE DEVELOPMENT OF PRIORITY STATEWIDE GEOSPATIAL DATABASES

"For multi-application, statewide GIS coverages, the GIS Steering Committee should play a role, if not take outright responsibility, for seeing that these statewide coverages are developed, and developed well."
— 1994 Annual Report to the Legislature
Nebraska GIS Steering Committee

The Nebraska GIS Steering Committee has recognized for some time, that one of its most effective areas of focus is coordinating the development and maintenance of statewide geospatial databases that are needed by a broad cross-section of geospatial data users. This was reaffirmed in January 1998, when the Steering Committee adopted as one of its long-range goals:

*"**Priority Database Development.** Actively coordinate the development, maintenance, and distribution of priority statewide digital geospatial databases."*

Because the GIS Steering Committee does not have the resources to directly develop these priority databases, it must pursue this goal by:

- identifying and highlighting those databases it feels are priorities for development,
- working with others to outline and endorse related database standards,
- facilitating database development and maintenance partnerships, and
- providing support and encouragement to the database developers.

THE FRAMEWORK DATA CONCEPT

The need for coordination in the development, maintenance and distribution of key geospatial databases is also recognized at the national level. Many of the same databases (rivers, roads, aerial photography, etc.) that are needed for state and local applications are also needed by federal agencies. To avoid costly duplication of effort and to realize the most from the limited database development resources that are available, intergovernmental coordination is essential.

At the national level, eight geospatial databases have been identified as being widely used and needed by a cross-section of agencies. In recognition of their wide spread use and national importance, these eight databases have been called Framework Databases. For the last couple of years, an extensive intergovernmental dialogue has occurred exploring related database standards and models for the cooperative development, maintenance, and distribution of the following Framework Databases.

Transportation. Features used to move people and goods from place to place, including roads, railroads, trails, parks, airports and waterways and related features such as bridges and tunnels.

Hydrology. Data regarding the location and attributes of surface water features, such as streams, rivers, lakes, ponds, canals and ditches.

Digital Orthoimagery. Digitally formatted aerial photography or satellite imagery from which displacements caused by terrain relief and sensor tilt have been removed. The result combines the image characteristics of a photograph with the geometric qualities of a map.

Elevation Data. Data regarding the vertical distance from a datum to a point or object on the earth's surface.

Political or Government Units (Boundaries). The geographic extent of units of government, such as states, counties, cities, and other incorporated places, towns, and townships, American Indian and Alaska native regional boundaries.

Geodetic Control. A network of points with precisely known coordinates from which the location of other points can be referenced.

Cadastral Reference System. The Public Land Survey System or similar system, and associated survey corners and boundaries for the purpose of subdivision.

Cadastral Land Ownership (Property Parcels). The geographic extent of the past, current and future rights and interests in real property, including the spatial data necessary to describe its geographic extent. A cadastre is an official register of the location, quantity, value and ownership of land.

In addition to the above eight nationally designated Framework Databases, the Nebraska GIS Steering Committee has also identified two other database categories that are of particular importance to Nebraska.

Digital County Soil Surveys **Land Cover/Land Use**

The Nebraska GIS Steering Committee has added these two database categories to the Framework Databases outlined above and designated them all as priorities for database development.

FRAMEWORK DATA SURVEY

In addition to the efforts to cooperatively develop standards for Framework Databases, there has also been an effort to determine who is currently developing and maintaining databases of these types for the different areas of the country. This assessment was a major challenge since elements of these database categories are maintained at all levels of government, all over the country.

During the past year, the Coordinator for the GIS Steering Committee has acted as the Nebraska coordinator for a national effort to survey local governments, regional, state and federal agencies regarding their development and maintenance of Framework Databases. In Nebraska, a total of 191 surveys were sent to all 93 counties, all first class cities, all Natural Resources Districts, 25 state agencies, and selected irrigation and power districts and federal agencies. The purpose of this initial survey is to determine who is currently doing any of this type of database development work. Follow up efforts will then explore if and how these efforts might be integrated and coordinated. An analysis of the responses to this Framework Data Survey is not yet available, at the time of this report.

UPDATE ON MAJOR GEOSPATIAL DATABASE DEVELOPMENT EFFORTS

As noted above, intergovernmental efforts are underway to define common database standards and to identify those agencies that are currently developing or maintaining elements of the Framework Databases. It is also important to note the progress that has been made, over the past year, in the development of some of these priority databases for Nebraska.

Digital Elevation Models. The Natural Resources Commission, in partnership with the US Geological Survey, is close to completing a three-year effort to develop a Digital Elevation Model (DEM) for the entire state. These DEMs are a digital representation of the elevation and contour of the earth's surface. They are based on a 30-meter grid and are an important database layer for several types of computer and GIS modeling. DEMs are also a necessary production step in the development of Digital Orthophoto Quarter Quadrangles (DOQQs). The original three-year plan called for completion of this project by June 1999, and the project is currently ahead of schedule and completion is expected around the end of 1998. See page 44 for additional information on this effort.

Digital Orthophoto Quarter Quadrangles. The Natural Resources Commission is also developing Digital Orthophoto Quarter Quadrangles (DOQQs) as a part of its partnership with the US Geological Survey. DOQQs are digital photos of the earth's surface that have been corrected for camera tilt and terrain displacement, and geo-referenced. DOQQs combine the features of photos and maps. These DOQQs are based on 1993 aerial photography, have a 1-meter resolution, and meet National Map Accuracy Standards for a 1:12,000 map product. The DOQQ project had an original three-year timeline ending in June 1999. This project is on schedule, with approximately 80 percent of the state completed *(see Figure 1, page 17).* See page 41 for additional information.

Land Cover. The Conservation and Survey Division's (CSD) Center for Advanced Land Management Information Technologies (CALMIT) is developing a comprehensive land cover characteristics database for the geographic area of Nebraska. This is part of a broader effort funded by the Gap Analysis Program/USGS Biological Resources Division, the U.S. Environmental Protection Agency and CSD. The USGS/EROS Data Center, the Nebraska Game and Parks Commission, the Nebraska State Museum, the Nature Conservancy, the USDA/Natural Resources Conservation Service, NASA, and the U.S. Forest Service are providing additional support. As part of this project, a statewide preliminary analysis of the land cover characteristics has been completed, but at this time this preliminary analysis is still undergoing review. This database is based on Landsat satellite imagery with a 30 x 30 meter resolution (about .25 acres). See page 49 for more information on Land Cover/Land Use.

Digital County Soils Database. The USDA Natural Resources Conservation Services, the Nebraska Natural Resources Commission, and the Conservation and Survey Division - UNL are cooperating on a joint project to develop digital versions of county soil surveys. Known as Soil Survey Geographic (SSURGO) Database, these soil surveys are digitized versions of the published county soil surveys that have been compiled on DOQQs at a scale of 1:12,000. With over 49,000,000 acres in Nebraska, this is a huge undertaking. At this point (11/1/98), 25 counties have been digitized *(see Figure 2, page 18).* The databases for two of those counties have been formally certified and the others are awaiting certification. See page 53 for more information.

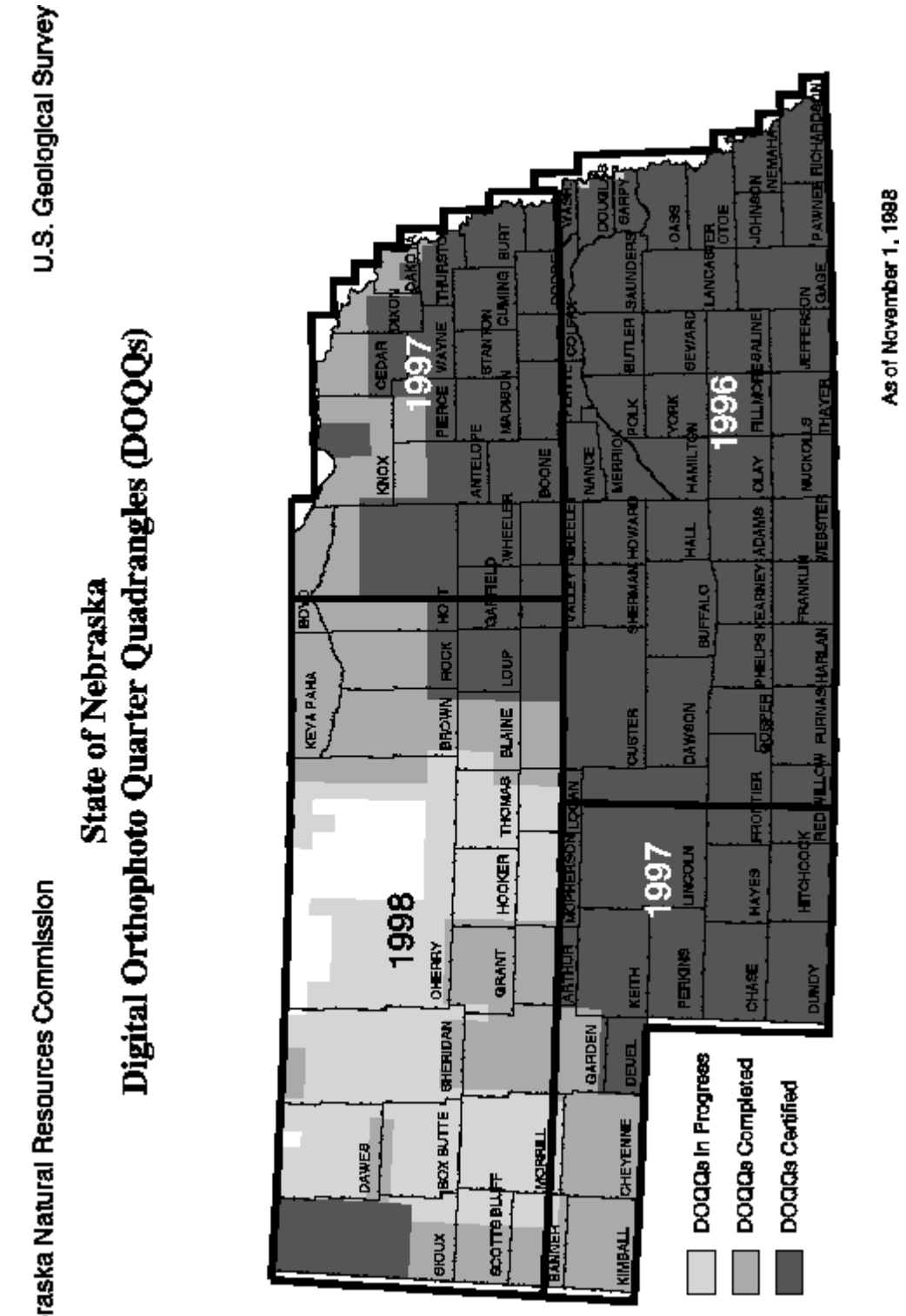

Figure 1. Production of Digital Orthophoto Quarter Quadrangles (DOQQs).

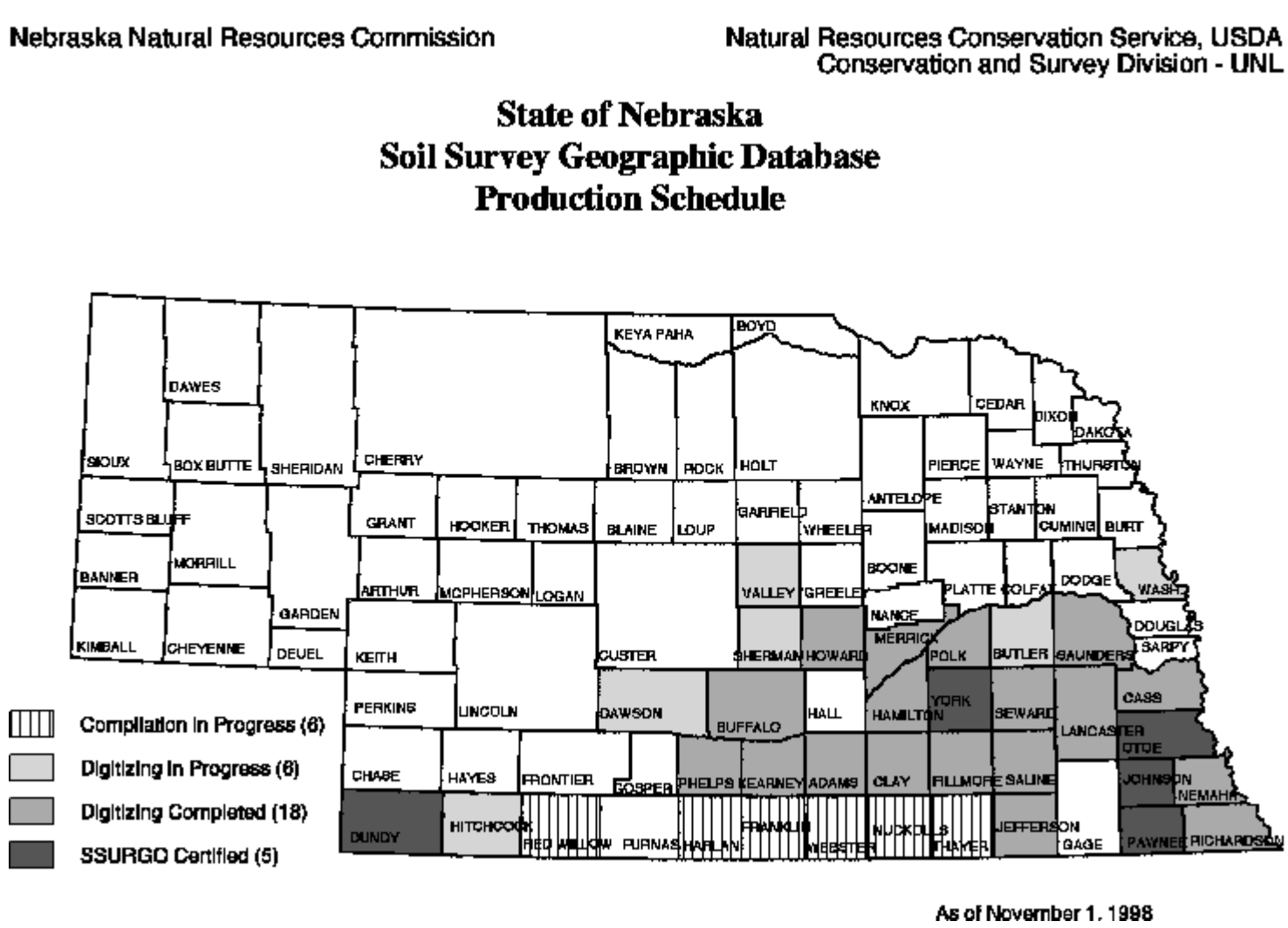

Figure 2. Production of Digital County Soil Surveys.

ASSESSMENT OF NEED AND PLANNING FOR FUTURE PRIORITY DATABASE DEVELOPMENT AND MAINTENANCE

As part of another effort to realize the GIS Steering Committee's long-range goals to:

> ***Priority Database Development.*** *Actively coordinate the development, maintenance, and distribution of priority statewide digital geospatial databases,*

the Steering Committee has also commissioned assessments of the current status and perceived unmet need for these priority databases. The Steering Committee invited the following state agencies to conduct these initial assessments and to report back to the Steering Committee on their findings.

- Transportation Databases - Department of Roads
- Governmental Units (Boundaries) - Legislative Computer Services
- Digital Orthophoto Databases - Natural Resources Commission
- Elevations Databases - Natural Resources Commission
- Hydrology Databases - Natural Resources Commission
- Land Cover and Land Use Databases - Conservation and Survey Division - UNL
- Soils Databases - Natural Resources Commission
- Geodetic Control Databases - State Surveyor
- Public Land Survey Databases - State Surveyor
- Property Parcel Databases - Property Tax Division

If a significant unmet need for the specific database existed, agencies drafting these initial assessments were encouraged to draft proposals for the creation of a subcommittee to develop recommendations for achieving the objectives of the Steering Committee's database goal for that database. Issues to be considered included current database deficiencies, groups to include in a study committee, standards needed, database integration and maintenance issues, and resources needed for the study committee.

These reports were intended to provide the foundation for further discussion and action by the Steering Committee. In their current form, these reports are best seen as a reflection of the perspective of the drafting agency, and not necessarily that of the Steering Committee as a body. These Initial Assessments and Draft Database Reports are included in Appendix C of this report (Property Parcel Database Report is not yet available).

Database Advisory Committees Established. Based on these Initial Assessment Reports, and further discussions within the GIS Steering Committee, the Steering Committee has authorized the formation of five Advisory Committees to further study specific databases and to develop draft action plans for the Steering Committee's consideration *(see Appendix D, page 60).* These Advisory Committees are charged with considering a range of issues related to these specific databases, including standards, and database development, maintenance and distribution. The five Database Advisory Committees that have been authorized by the GIS Steering Committee are as follows:

Transportation Databases	Governmental Units (Boundaries)
Digital Orthophoto / Elevations Databases	Hydrology Databases
Land Cover and Land Use Databases	

FACILITATING LOCAL GOVERNMENT LAND RECORD MODERNIZATION

For the last few years, the facilitation of land record modernization has been one of the GIS Steering Committee's priorities. This foci was reaffirmed in January 1998, when the Steering Committee adopted as one of its long-range goals the following:

> ***Land Record Modernization.*** *The promotion and facilitation of local government land record modernization and GIS development.*

This section of the report provides an update on four initiatives that the GIS Steering Committee has sponsored or supported that are related to this general area.

- Development of a Public Land Survey System Geospatial Database
- Guidelines for Local Government Multipurpose Land Information Systems
- Nebraska Plane Coordinate System
- Technical Assistance to Local Governments for Cadastral and Geo-referencing Maps

DEVELOPMENT OF A PUBLIC LAND SURVEY SYSTEM GEOSPATIAL DATABASE

A necessary foundation for bringing property parcels into modern computerized land information systems is a database which provides the locational (latitude/longitude) coordinates of the Public Land Survey System (PLSS) section and quarter-section corners. In Nebraska, all land ownership is legally tied to these PLSS corners. There are approximately 100,000 such PLSS corners in Nebraska, and they were originally surveyed roughly 100 years ago.

The 1997 Annual Report outlined a PLSS Pilot Project Proposal that was developed by an Advisory Committee of the GIS Steering Committee and sent to all of Nebraska's County Clerks, NRDs and selected state and federal agencies. The intent of this PLSS Pilot Project Proposal was to test both a methodology and an organization model for developing the locational coordinates on the PLSS corners in Nebraska. In addition to the primary objective of creating a database with PLSS corner coordinates, another major objective was that any database created should be upgradeable, as better information on some of the corner coordinates became available.

Considering that there was no dedicated funding available for the project, the response to this PLSS Pilot Project Proposal was surprisingly strong. Working within less than a three-week timeline for response, representatives from twelve counties expressed an interest in having their county considered for the initial pilot project. The Steering Committee initially expected to select only one county for the pilot project. However because of the level of interest, ultimately four county-specific Interagency Agreements (Adams, Dawson, Hall and Merrick counties) were signed with a total of 18 public entities agreeing to partner, in various combinations, in the four county agreements.

Once the Pilot Project Proposal was drafted, circulated and Interagency Agreements concluded, the actual implementation of the projects was managed by the State Surveyor's Office. The State Surveyor's preliminary report on the Adams County project follows. That project was successful in creating a PLSS database for the 24 x 24 miles area (16 townships) of Adams County that contains the estimated coordinates for over 9,000 PLSS section, 1/4 section, 1/16-section corners and centers of sections. Work is continuing on the PLSS Pilot Projects in the other three counties.

Adams County Public Land Survey Pilot Project

A Preliminary Report to the
Nebraska GIS Steering Committee
Jim Brown, State Surveyor
October 5, 1998

Scope of Project

This report details information generated by the input and adjustment of PLSS data for Adams County. Adams County is one of four counties (Adams, Dawson, Hall and Merrick) for which PLSS pilot projects were initiated under the joint sponsorship of the Nebraska GIS Steering Committee and the State Surveyors Office. The goal of the project is to identify methodology and systems to input data from the Public Land Survey records into a database, which is usable by Geographic Information Systems at all levels. The basic objectives of the pilot project, as defined by the GIS Steering Committee's PLSS Advisory Subcommittee, were:

1. Have a countywide PLSS coverage for at least one county and hopefully from four counties.

As of this date we have a countywide PLSS coverage for Adams County and are proceeding with Dawson County.

2. Develop both the corner coordinates database and graphical coverage down to quarter sections.

We have developed corner coordinates and graphical coverage for Adams County down to ¼ ¼ section level.

3. Demonstrate overlaying the graphical coverage onto DOQQ's.

Corner coordinate database and graphical coverages have been placed over DOQQ coverage for Adams County.

4. Demonstrate enhanced levels of spatial accuracy for PLSS corner coordinates at multiple steps of upgrade.

Spatial accuracy has been tested in Adams County. See ANALYSIS section.

5. Develop baseline estimate requirements for a larger scale effort to develop a statewide upgradeable PLSS coverage.

Not completed.

6. Develop models and establish institutional relationships for partnerships and/or coalitions that will be needed for a larger sustained effort to develop a statewide PLSS coverage and for land record modernization efforts in general.

Not completed.

7. Develop a statewide PLSS reference database of Standard PLSS corner IDs and at least a rough database framework for the on-going development of an upgradeable, statewide PLSS coverage.

The BLM has provided a data set of digitized coordinate values for most of the section corners in Nebraska using recommended naming conventions. This set does not include most of the ¼ section corners or other aliquot corners (which can be developed using the pilot project methodology). This set has been compared and refined by inclusion of data developed by NRC.

8. Evaluate and gain experience/expertise with Bureau of Land Management's GMM software, and/or other available cadastral development software.

The State Surveyors Office (SSO) has gained considerable experience with GMM software. No other cadastral packages were located.

9. Test the ability to transfer PLSS pilot project data into standard GIS software data formats.

The SSO has transferred the data into ArcView, MapInfo and AutoCad Map software.

This report deals only with Adams County. Information on the other counties will be reported, as it becomes available. Adams County data is available earlier primarily due to dedication and diligent work on the part of the Adams County Surveyor, more particularly, Roger Parks and Greg Vossler. Partners in the other three counties have completed data from the original General Land Office (GLO) surveys, except for isolated difficult townships and transmitted this data to the SSO.

Methodology

After approval of the project by the GIS Steering Committee, the State Surveyors Office (SSO) investigated software and selected Geodetic Measurement Management (GMM) from the Bureau of Land Management (BLM) as being the only package that had the potential to meet the demands of the project. At the same time Larry Zink, GIS Steering Committee Coordinator, was setting up joint ventures and partnerships for the funding and works involved. These partnerships included: The GIS Steering Committee, SSO, Adams County, Dawson County, Hall County, Merrick County, BLM, City of Hastings, Central City, Central Platte Natural Resources District (CPNRD), Nebraska Natural Resources Commission (NRC), Nebraska Game and Parks Commission (NG&P), and the Bureau of Reclamation. Most of these partners were to provide in kind work but several pledged small amounts of funding. As of this date none of the funding has been used. Specific information on the partnerships is available from Larry Zink, GIS Steering Committee Coordinator. The final product was to be a data set of the PLSS corners, which was to reside at the local county office with personnel at that office trained to maintain and refine the data.

In the basic design of the project, the following tasks were to be performed: The BLM, working with NRC, provided an initial digitized PLSS control database containing only the section corners. The BLM was to provide training. The Counties along with CPNRD, NG&P and the City of Hastings were to input survey data from the original GLO or resurveys. The SSO and the BLM were to evaluate and/or refine the data. The Counties, NRC and SSO, using funds if necessary, were to obtain GPS observations on selected corners. SSO was to evaluate and process the data using GPS measurements. NRC was to evaluate the data for inclusion into GIS coverages.

The naming convention of the BLM of the PLS corners has been accepted for this project. The State of Florida has also accepted this naming convention. A detailed explanation of this

convention is contained within the documentation for GMM and is available from the BLM or the SSO.

Training

The training of operators of GMM started on September 22, 1997, at College Park in Grand Island, Nebraska. The BLM provided copies of the software and two trainers, Milbert Krohn and Joe Beaudin. The first week of training covered basic data input and error detection. Upon completion of this phase of the training, the operators returned to their offices and began input of data. On November 17, 1997, the same people returned for training in the adjustment and apportion of the data. Twelve people were trained including those from the four counties involved, the City of Hastings, the Game and Parks Commission, Central Platte NRC, Bureau of Reclamation and the SSO. Each training session lasted for 4 to 5 days.

Data Entry

Upon completion of the training an agreement was reached which specified who would be responsible for each data set by individual township. These agreements for data included all trained operators except the SSO, who was to collect the data and provide quality assurance testing and coordination with the BLM trainers. Adams County pursued data collection very diligently and completed their entire county within two months. Upon completion of their data sets they referred them to the SSO and requested assistance in using GPS information of some of the data points. Map quality GPS equipment was loaned from the SSO to Adams County for this purpose. The GPS data was transferred to the SSO for inclusion into the data sets. Hall, Dawson and Merrick Counties have transferred data to the SSO for verification. This data has been transferred to the BLM for inspection but verification has not been completed due to time constraints within the SSO and the BLM.

Adams County Data

Adams County consists of a regular 24 mile by 24-mile county with 16 townships. The Platte River cuts through the county in the far Northwest corner. There have been no full township resurveys by the BLM or any other entity. For this reason the original data abstract includes only the original survey records, which date to the 1860's. Adams County, using the measurements as shown on these original plats and notes input all data into GMM. The control data was obtained from the BLM. This consists of section corners, which were digitized from the 7-½ minute quadrangles. After this data was input, Adams County measured coordinate values for approximately 82 section corners using the map quality GPS units provided by the SSO.

Procedures

The data from the 1860's original government surveys was abstracted directly into GMM using the standard GMM program by staff of the Adams County Surveyor. This entry of the data was checked for accuracy using routines, which are built into GMM. This verification is done without respect for digitized or other control. Upon completion of the entry of the survey data, the control data was added using GMM. Adams County then determined the relative strength to be given to each measurement based upon data fit, statistical methods and experience from field observations. This data was then transferred to the SSO. Adams County then began observations on section

corners using the Sokkia GPS receiver. They attempted to obtain observations on all township corners, at a corner on the township lines and equidistant between the township corners, and at the middle of the township. This receiver is a single channel, map quality receiver. This data was differentially corrected using the Grand Island base station. This GPS information was then sent to the SSO for inclusion in the project. The SSO used CORPSCON software, available from the Corps of Engineers, to convert the GPS data into a form and coordinate system compatible with GMM.

Analysis

Quality of Initial Digitized Control Data. The GMM data obtained from Adams County was inspected and transmitted to Milbert Krohn, BLM, for his comments. The GPS values were compared to the digitized values for all of the points where GPS information was available. On the points tested the average error in the digitized data was 18.81 feet. The data passed the 90% confidence level with an error of 34.05 feet. The maximum error in the data was 60.58 feet. These errors are computed using the GPS data as absolute when, in fact, it is also subject to errors. When GPS was checked against known points in Adams County, the error in GPS was generally in the magnitude of 3 feet. It was assumed that the GPS error is negligible when compared to the digitizing errors and it was ignored.

Selection of Best Available Data. Next, the data was adjusted using all control (digitized and GPS). During this adjustment the GLO survey measurements were tested by comparison with the digitized and GPS locations for the corners. Individual cases were inspected when the GLO survey measurements were considerably different than those that could be derived from the digitized or GPS locations. The DOQQ's for Adams County, obtained from the NRC, were used during this phase to assist in verifying the digitized locations. They were only used to determine if the operators who digitized the data might have had identifiable points, supported by lines of occupation, when they made the determination of the location. If there were no identifiable lines of occupation on the DOQQ's and the position of the digitized point was not supported by GLO measurements, we assumed that little or no evidence was available during development of the 7 ½ minute quad sheets. This is further supported by the digitized data obtained from the BLM, which contains information on the point. In these cases, the section line on the 7 ½ minute quad is shown with a dashed (unsure) line and reported as such in the BLM digitized data. In these cases, the digitized point was considered suspect and eliminated from the data set.

If there were identifiable lines of occupation on the DOQQ's and the BLM digitized data reported confidence in the position, but the position of the digitized point was not supported by GLO measurements, we assumed the GLO survey data was suspect. In these cases, the error estimates on the GLO data were increased to allow them to more closely comply with the digitized points. In both of the above cases, surveying judgement is required to make the decision and it would be highly recommended that the County Surveyor actually inspect the situation in the field. Routines are included in the GMM software package for this type of analysis. In no case were points digitized from the DOQQ's and used to replace BLM digitized points. In most cases where identifiable lines of occupation existed on the DOQQ's, the BLM digitized points were located within the expected accuracy of the DOQQ's. This observation does not support replacement of BLM digitized data with points obtained from the DOQQ's.

Initial Balance of Data Using Digitized Control. After this analysis and adjustment of the data, the dataset was balanced using only the digitized control points, along with the GLO

measurements. All of the GPS points were held out of the dataset to be used as a control set. At this time the adjusted values for the corners were checked against the GPS control set with the following results on 82 points. The average error was 18.4 feet. The maximum error was 47.2 feet. 95% of the points were within 34 feet of the GPS control set.

Rebalance of Data Using GPS Control. Next the GPS control on the township corners was added to the data set to see if the addition of a small number of GPS points would improve the set. GPS measurements were available for 22 of the 25 township corners. These 22 GPS observations were added to the set and it was adjusted again. After this adjustment the average error decreased to 16.6 feet. The maximum error decreased to 42.9 feet and 95% of the points were still within 34 feet.

Next all of the GPS data was included in the set and it was adjusted again. In this case there is no control set to test the data.

Conclusions

The analysis of the data disclosed that the digitized data from the USGS 7.5 minute quad maps was much better than might have been expected. The BLM recommended error estimates in the range of 50 to 60 feet but these error estimates are much too large. Error estimates of approximately 30 feet are more in order and supported by the data. This accuracy in digitizing cannot be extrapolated from Adams County into the State at large because the area of study has county roads and fences on most section lines. This may assist in the digitization of the points and accuracy may degrade as areas are encountered where section line roads and fences are less frequent.

The quality of the original government surveys is very much as expected by surveyors who have continually checked these measurements. The original GLO surveys were conducted over 100 years ago, by contract with minimal inspection. Considering the value of the land and hardships encountered the work is quite accurate but by today's standards and values they are inaccurate and contain errors. The inclusion of survey measurements is a necessary step to develop the mathematical relationships needed to expand the data set to include all PLSS corners and estimate the position of those corners. The inclusion of GPS positions on a small number of section corners did not show significant improvement in this data set. This is most likely caused by the accuracy of the original GLO measurements. I believe the inclusion of current or modern survey measurements would have improved the data set significantly and would have worked with the GPS data to improve the entire set. Without current or modern survey measurements the error estimates on the original government survey measurements erode the improvements provided by GPS measurements before it can spread to a significant number of points. If more accurate modern survey measurements can be included, it would be expected that the effect of GPS on the other points would be more significant. The GMM analysis of the data also provides clear clues to where such measurements are needed. The inclusion of modern survey measurements was not a part of the original pilot project design, but the flexibility and upgradeability, which was a part of the design, will allow Adams County, with training they have obtained, to incorporate these measurements and improve the product.

The data set now includes many ¼ corners, centers of sections, 1/16 corners and 1/64 corners that were not originally available. The digitized data set consisted of 832 section corners. The set now has positions for 9,280 corners.

Extensions

At this time, these data sets have been exported to a theme in ArcView as a database file. This file can be combined with coverages from the Natural Resources Commission of the Digital Orthophoto Quarter Quads (DOQQ) and their relationship to photo features can be examined on a case by case basis. The next logical step in the evolution of this data set would be the inclusion of more modern, and hopefully more reliable, survey measurements. These measurements currently reside in surveys filed, and on record, within the Adams County Surveyors Office and could easily be included in the data set. The addition of modern survey measurements to replace the original measurements would be easy if the work could be done where the records are housed. The addition of this data would be a very cost-effective way to improve the final data set and error estimates should decrease dramatically. Most of the modern measurements can be expected to have an accuracy of ±1 foot in distance measurement. In many cases these same modern measurements do not have associated bearing measured in absolute mode, although angles may be given. In this case the original (cardinal) bearings could be used. The reduction of the distance error estimate from 2,000 PPM (10 feet per mile) to 500 PPM (2 ½ feet per mile) could be expected to combine with the GPS observations and refine the computed coordinates. In the case of Adams County, GPS control exists every 3 to 4 miles. At this level of densification, when points are no more that 2 to 3 miles from GPS control, the use of survey measurements with an error estimate of 500 PPM should result in errors much less than the current 20 to 30 feet in the final data set. Until modern survey measurements are added to the data set the inclusion of more GPS control does not appear to be cost-effective, at least in the case of Adams County.

It is hoped that the Adams County Surveyor will assign staff and begin the inclusion of modern survey measurements in the near future. In the original conception of the project, this addition of modern survey data was anticipated but was planned to be executed after completion of the pilot project. Adams County is now well positioned to begin this step.

Additional work needs to be done to include the GMM data sets as the controlling element for spatial referencing when developing land ownership and other GIS themes. If this is possible and feasible, then ownership and other data can be geo-referenced by connection to the points in the GMM data set. These connections would be available from current public records. The use of this data as the controlling item in cadastral, and other polygons, is beyond the scope of this pilot project but is of primary interest to the SSO for tax assessment mapping solutions. The data set for Adams County has been transported to Milestone, Inc., who is currently under contract to provide cadastral mapping to the Adams County Assessor. This should allow any new cadastral maps to be referenced to conventional map projections. This would not have been feasible without the existence of this data set. I will attempt to maintain contact with Milestone, Inc. to observe their progress and methodology.

We have moved into Dawson County at this time and will attempt to use what we have learned in Adams County. Unfortunately, the first step in Dawson County has been to discard the GLO measurements input by the Dawson County Surveyors Office. This step is dictated by experience obtained in Adams County. The inclusion of original GLO measurements appears to be the main cause of inaccuracies in the data set. It is necessary to modify the pilot project at this time to include modern survey measurements rather than original survey measurements, when they are available. A new raw data set is being developed using resurvey measurements available in the Survey Record Repository and filled with GLO measurements where necessary. The Dawson County Surveyor has purchased geodetic quality GPS equipment and is obtaining observations on

numerous section corners. This redirection will significantly slow the progress of the pilot project but in light of our observations in Adams County I believe it is necessary.

The GMM approach is operational and does produce the desired results. The problem with the GMM approach is the level of expertise required by the personnel. The software is under constant evolution and the concepts are not easy to grasp. The complex operation of the software is being addressed by new development, particularly in the Windows environment. This does not help in understanding the concept of measurement analysis, measurement adjustment, public survey methodology and other related technical issues. At this phase of the project it can be easily seen that the operation cannot be performed by personnel without technical understanding of issues generally related to surveying, engineering or geodesy. Familiarity with computer operations is also needed. In the final analysis the personnel required to perform the tasks within the GMM approach may not be available within local governments current staff. In some cases, such as Adams County, these people are available and can easily be trained in GMM methodology. In other cases it will be necessary for the local governments to hire new specialized people or obtain the services of consultants for the project.

The original PLSS pilot project design incorporated numerous operators to do data input. I believe this was a flaw in the original design. Training and understanding of the concepts is far too intense to casually train operators for small amounts of data. Data input is not nearly as time consuming as originally estimated but training is far more time consuming that originally estimated.

GUIDELINES FOR LOCAL GOVERNMENT MULTIPURPOSE LAND INFORMATION SYSTEMS

In a further effort to facilitate the modernization of local government land records the GIS Steering Committee has established an Advisory Committee on Standards for Multipurpose Land Information Systems. This Advisory Committee includes representatives from state agencies, city and county offices and the private sector. The current focus of the Committee is the development of a Nebraska Guidebook for Local Government Multipurpose Land Information Systems. This Guidebook is intended as a resource for local governments as they develop land information systems. Land Information Systems (LIS) are specialized GIS's tailored to land record information and many of the applications that are commonly used in local government GIS.

As presently conceived, the Guidebook will be a multi-section, loose-leaf notebook that can be updated as the technology and standards change. The Guidebook will include specific recommendations, background explanatory material, and references for further research. At this point, the Steering Committee has approved Advisory Committee's draft of the following three sections of the Guidebook:

- Fundamental Elements of Multipurpose Land Information Systems
- Geographic / Geodetic Control
- Base Map

The complete text of the approved sections is available via the Internet at: "*http://www.ids.state.ne.us/gis/LIS_Stds_Intro.html"*. The major recommendations that are outlined in these first three sections are provided on the following pages. The Advisory Committee is continuing to work on drafts for the other sections.

Guidebook for Local Government Multipurpose Land Information Systems
Major Recommendations from First Three Approved Sections

Geographic / Geodetic Control Section

Recommendation VI-a. *We recommend that new multipurpose GIS/LIS systems are based on NAD 83 and NAVD 88 from the beginning, thus avoiding some of the possible problems associated with transformations.*

Recommendation VI-b. *We recommend the use of the State Plane Coordinate System, NAD 83, as the basis for the recording of positions in local land-data systems in Nebraska. Selection of any other projection should be done reluctantly and only after most careful consideration.*

Recommendation VI-c. *We recommend that GIS/LIS systems developed with the goal of providing a multipurpose cadastre for local government use should be referenced to a local geodetic reference framework that is properly connected to the National Spatial Reference System (NSRS).*

Recommendation VI-d. *For all the nonfederal lands in Nebraska that are subdivided according to the Public Land Survey System (PLSS), we recommend that the geodetic reference framework for the cadastre be the section corners and the quarter-section corners of the PLSS, including the center point of each section. Each county (or municipality) that is planning to develop a GIS/LIS-based cadastre program should initiate a progressive program to relocate and monument these points according to the legally established procedures and properly connect them to the National Spatial Reference System to obtain geodetic coordinates.*

Base Map Section

Recommendation VII-a. *To provide the foundational framework upon which the development a local government multipurpose land information system can be based, we recommend both a Public Land Survey System base map and a surface features base map. Both base maps should be tied to the National Spatial Reference System and have a level of spatial accuracy appropriate to the range of applications planned for a given area.*

Recommendation VII-b. *The following map scales and their corresponding National Horizontal Map Accuracy Standards are recommended guidelines for determining the positional accuracy needed for base maps in the development of a multipurpose local government GIS/LIS:*

Relative Size of Property Parcels	*Map Scale*		*Nat'l Horizontal Map Accuracy Std.*	*Equivalent Metric Scale*
Urban areas	*1:600*	*(1" = 50')*	*±1.7 ft.*	*1:500*
	1:1,200	*(1" = 100')*	*±3.3 ft.*	*1:1,000*
Large urban and suburban	*1:2,400*	*(1" = 200')*	*±6.7 ft.*	*1:2,500*
*Rural areas **	*1:4,800*	*(1" = 400')*	*±13.3 ft.*	*1:5,000*
	1:9,600	*(1" = 800')*	*±26.7 ft.*	*1:10,000*
	1:12,000	*(1"= 1,000')*	*±33.3 ft.*	*1:10,000*

** see "Making Choices" page VII-18, 19 of the Guidelines.*

Recommendation VII-c. *In Nebraska, PLSS base map data should be in the form of a digital database that includes all the original government (PLSS) corners, all restored survey marks representing those corners, and all county boundaries within a given area of coverage. Each government corner and monumented survey mark should be referenced in a related attribute database by a unique identifier and by the best available approximation of its coordinate location.*

Recommendation VII-d. *It is recommended that local governments considering the development of a multipurpose GIS/LIS, consult with the Nebraska State Surveyor's Office to explore the suitability of the Geographic Measurement Management approach for developing their PLSS base map. It is further recommended that local governments adopt the system of unique PLSS corner identification numbers developed by the U.S. Bureau of Land Management for this purpose.*

Recommendation VII-e. *It is recommended that a digital orthophoto be utilized as the surface features base map for a multipurpose GIS/LIS. A surface features base map provides the shapes and locational coordinates of major surface features such as roads, railroads, rivers, lakes, and other objects that might be seen from an airplane. In evaluating the adequacy of a given digital orthophoto to serve as a surface features base map, the spatial accuracy, resolution, and timeliness of a digital orthophoto should be compared to the requirements of planned and anticipated applications of the multipurpose GIS/LIS for a given area*

NEBRASKA PLANE COORDINATE SYSTEM

The 1997 Annual Report noted the GIS Steering Committee's support for proposed legislation to place into Nebraska statutes an official definition of the Nebraska Plane Coordinate System. This legislation, known as LB 483, the Nebraska Plane Coordinate System Act, was introduced in the First Session of the 95th Nebraska Legislature by Senator Joyce Hillman and co-sponsored by Senator C.N. Bud Robinson.

The GIS Steering Committee's support for this legislation was based on the complementary goals of facilitating intergovernmental information sharing and of reducing public expenditures related to the collection and maintenance of land records. Data sharing between government entities, and between public and private sectors, can reduce the costs and increase the overall efficiency and capabilities of these automated mapping and analytical systems. Data standards are key to facilitating data sharing, and, in particular, mapping coordinate system standards are a fundamental key for facilitating the sharing of land record information.

In 1998, the Nebraska Legislature incorporated the legislative language of LB 483 into LB 924, a broader piece of legislation enacted by the Legislature that included numerous initiatives to facilitate information technology coordination and planning. This legislation, as passed, will not mandate any entity to use the Nebraska Plane Coordinate System in place of another available coordinate system. It will, however, place into statute a clear definition of this commonly used coordinate system. This will remove the possibility of ambiguity when a public or private entity chooses to refer to the use of this coordinate system (instead of using the more generic term "State Plane") in contracts, regulations or inter-agency agreements.

The GIS Steering Committee sees the enactment of this legislation as one more step forward in helping to facilitate local government land record modernization.

STATE SURVEYOR TECHNICAL ASSISTANCE IN CADASTRAL MAPPING

At its meeting on January 16, 1998, the GIS Steering Committee endorsed another initiative related to its overall efforts to facilitate local government land record modernization. At that meeting, the Steering Committee endorsed the addition of the following language to the statutes (section 84-407) related to the State Surveyors Office:

> *"The surveyor shall also provide technical assistance, support, and advice to the various counties, cities, and other governmental bodies in Nebraska in their endeavors to produce and maintain cadastral or other geo-referenced maps."*

This endorsed language was enacted by the Nebraska Legislature as part of LB 924 during the 1998 session. In addition, LB 924A provided initial operational funding to realize the intent of adding this responsibility to the State Surveyors Office.

Need for Technical Assistance. The PLSS Pilot Projects, that were designed to calculate estimates of the geographic coordinates of the Public Land Survey System (PLSS) in four Nebraska counties clearly demonstrated the need that local governments have for technical assistance in the development of digital property parcel (tax) mapping. GIS technology is based on locating and analyzing features based on their position on the earth's surface. With property parcels, this locational component is based on the PLSS. As local governments modernize their land records to incorporate the potential of technologies such as GIS, a solid understanding of the mathematical relationships of the PLSS is key. Technical assistance from the State Surveyor's Office has been a key factor in the progress in those four county pilot projects.

By design, all four of the pilot project counties had a full-time county surveyor committed to this project. Unfortunately, most of Nebraska's counties do not have a full-time county surveyor and consequently this technical assistance will be even more necessary in those counties. The PLSS coordinate database is the underlying legal foundation for land ownership and property parcel mapping. To develop this key database, the State Surveyor and the GIS Steering Committee will need to work with county surveyors where they exist, and develop alternatives in those counties where they do not. For additional background information on the PLSS Pilot Projects and the role of the State Surveyor, see page 20. The GIS Steering Committee appreciates the support of the Legislature and the Administration in helping to make this technical assistance available.

Appendix

APPENDIX A

ARTICLE 26
GEOGRAPHIC INFORMATION SYSTEM

Section.

81-2601. Legislature; Intergovernmental Data Communications Advisory Council; findings. The Legislature finds that the Geographic Information System is a computer-based technology that captures, stores, analyzes, and displays information about the earth's surface from a geographically referenced system, that an interest in the system is rapidly increasing at all levels of government, and that an institutional mechanism is needed to encourage initiatives, coordinate efforts, avoid duplication, seek efficiencies, develop guidelines, policies, and standards for operations and management, promote education and training, and make recommendations so that such technology will benefit the entire state and endure as an analysis tool for decision makers.

The Intergovernmental Data Communications Advisory Council has found that there are many levels of experience, expertise, and hardware and software sophistication among the various levels of government and that guidelines, policies, coordination, and standards are required to realize the maximum benefits of this technology, avoid data quality problems., and resolve conflicts at a reasonable cost for the state.

It is the intent of the Legislature that a Geographic Information System Steering Committee be created with statewide responsibilities to take an active role in implementing the Geographic Information System. Such committee would help facilitate acquisition of such technology at all levels of government and make recommendations to the Legislature for program initiatives and funding and the fostering of communications, training, and education.

81-2602. Geographic Information System Steering Committee; created; members; appointment; terms; expenses. The Geographic Information System Steering Committee is hereby created and shall consist of fifteen members as follows:

(1) The director or designee of the Department of Administrative Services, the Department of Environmental Control, The Conservation and Survey Division of the University of Nebraska, the Nebraska Natural Resources Commission, and the Governor's Policy Research Office;

(2) The Director-State Engineer or designee;

(3) The State Surveyor or designee;

(4) The Clerk of the Legislature or designee;

(5) The secretary of the Game and Parks Commission or designee;

(6) The Property Tax Administrator or designee;

(7) One representative of federal agencies appointed by the Governor;

(8) One representative of the natural resources districts nominated by the Nebraska Association of Resources Districts and appointed by the Governor;

(9) One representative of the public power districts appointed by the Governor;

(10) Two representatives of the counties nominated by the Nebraska Association of County Officials and appointed by the Governor;

(11) One representative of the municipalities nominated by the League of Nebraska Municipalities and appointed by the Governor; and

(12) Two members at large appointed by the Governor.

The appointed members shall serve for terms of four years, except that of the initial members appointed by the Governor, one of the representatives of the counties shall be appointed for one year and the other shall be appointed for three years, one of the members at large shall be appointed for one year and the other for three years, and the representative of the public power districts shall be appointed for two years. Their successors shall be appointed for four-year terms. Any vacancy on the committee shall be filled in the same manner as the original appointment, and the person selected to fill such vacancy shall have the same qualifications as the member whose vacancy is being filled.

The members shall be reimbursed for their actual and necessary expenses as provided in sections 81-1174 to 81-1177.

81-2603. Committee; officers; advisory committees; meetings. The Geographic Information System Steering Committee shall elect a chairperson from its membership and such other officers as the committee deems necessary. As the need arises, advisory committees may be established by the committee from various levels of government, industry, or the general public to assist the committee.

The committee shall meet quarterly or upon the call of the chairperson.

81-2604. Committee; duties. The Geographic Information System Steering Committee shall:

(1) Make recommendations to the Legislature for program initiatives and funding;

(2) Establish guidelines and policies for statewide Geographic Information System operations and management to include:

(a) The acquisition, development, maintenance, quality assurance such as quality control standards, access, ownership, cost recovery, and priorities of data bases;

(b) The compatibility, acquisition, and communications of hardware and software;

(c) The assessment of needs, identification of scope, setting of standards, and determination of an appropriate enforcement mechanism;

(d) The fostering of training programs and promoting education and information about the Geographic Information System; and

(e) The promoting of the Geographic Information System development in the State of Nebraska and providing or coordinating additional support to address Geographic Information System issues as such issues arise;

(3) Report to, assist, and advise the Chief Information Officer in setting information technology policy; and

(4) Provide assistance as requested by the Nebraska Information Technology Commission to support the technical panel created in section 11 of this act.

81-2605. Committee; report. Annually, the chairperson of the Geographic Information System Steering Committee shall submit a written report, approved by the committee, to the Governor and the Clerk of the Legislature and shall send a copy of such report to the Intergovernmental Data Communications Advisory Council.

APPENDIX B

NEBRASKA GIS STEERING COMMITTEE

as of 11/12/98

James L. Brown - **Chair**
State Surveyor
555 North Cotner Blvd
Lincoln, Nebraska 68505
Voice: (402) 471-2566, FAX: (402) 471-3057
Email: jbrown@sso.state.ne.us

Lash Chaffin - **Vice Chair**
League of Nebraska Municipalities
1335 L Street
Lincoln, Nebraska 68508
Voice: (402) 476-2829, FAX: (402) 476-7052
Email: lnm@navix.net

Rick Becker
Coordinator, Info. Res. Cabinet - DAS
* representing Karen Kilgarin, DAS Director
521 S. 14th Street, Suite 200
Lincoln, Nebraska 68508
Voice: (402) 471-7984, FAX: (402) 471-4608
Email: rbecker@cio.state.ne.us

Dennis Burling
* representing Randolph Wood, Director
Department of Environmental Quality
P.O. Box 98922, 1200 "N" St., Suite 400
Lincoln, Nebraska 68509-8922
Voice: (402) 471-2186, FAX: (402) 471-2909
Email: deq082@mail.deq.state.ne.us

Blaine R. Dinwiddie
Omaha Public Power District
444 S. 16th St. Mall, ECC-2
Omaha, Nebraska 68102
Voice: (402) 552-5130, FAX: (402) 636-3947
Email: bdinwiddie@oppd.gov

Val Goodman
* representing Patrick O'Donnell, Clerk of the Legislature
Legislative Computer Services
Room 359, State Capitol
Lincoln, Nebraska 68509
Voice: (402) 471-2420, FAX: (402) 471-2126
Email: vgoodman@unicam3.lcs.state.ne.us

Jim Merchant
* representing Mark Kuzila, Director
Conservation and Survey Division
113 Nebr. Hall - Univ. of Nebraska
Lincoln, Nebraska 68588-0517
Voice: (402) 472-7531, FAX: (402) 472-2410
Email: jm1000@tan.unl.edu

John Miyoshi
Lower Platte North NRD
P.O. Box 126
Wahoo, Nebraska 68066
Voice: (402) 443-4675, FAX: (402) 443-5339
Email: miyoshi@nrcdec.nrc.state.ne.us

Dick Genrich
* representing Allan Abbott, Director
Department of Roads
P.O. Box 94759
Lincoln, Nebraska 68509-4759
Voice: (402) 479-4550, FAX: (402) 479-3884
Email: dgenrich@dor.state.ne.us

Mele Koneya
* representing Rex Amack, Director
Nebraska Game and Parks Commission
P.O. Box 30370, 2200 N. 33rd St.
Lincoln, Nebraska 68503
Voice: (402) 471-5484 , FAX: (402) 471-5528
Email: mkoneya@ngpsun.ngpc.state.ne.us

Yvonne Norton Leung, Director
Governor's Policy Research Office
Rm 1319, State Capitol, P.O. Box 94601
Lincoln, Nebraska 68509
Voice (402) 471-2414, FAX: (402) 471-2528
Email: ynleung@pro.state.ne.us

Bob Martin
* representing Catherine D. Lang
Property Tax Division
P.O. Box 98929
Lincoln, NE 68509
Voice: (402) 471-6179, FAX: (402) 471-5993
Email: bmartin@ptd.state.ne.us

Duane Stott
Scotts Bluff County Surveyor
P.O. Box 690, 785 Rundell Road
Gering, Nebraska 69341
Voice: (308) 436-6654, FAX: (308) 436-3154
Email: scb-co@PrairieWeb.COM

Cliff Welsh
Keith County Commissioner
1225 Road West 40
Brule, Nebraska 69127-2101
Voice: (308) 287-2251
Email: kcland@megavision.com

Dayle Williamson, Director
Natural Resources Commission
301 Centennial Mall South
Lincoln, Nebraska 68509-4876
Voice: (402) 471-2081, FAX: (402) 471-3132
Email: daylew@nrcdec.nrc.state.ne.us

Dennis Wilson
Omaha Public Works
1819 Farnam, Suite 600
Omaha, Nebraska 68183
Voice: (402) 444-5100, FAX: (402) 444-5248
Email: dwilson@ci.omaha.ne.us

Larry Worrell
Lancaster County Surveyor
555 S. 10th, Lincoln, Nebraska 68508
Voice: (402) 441-7681, FAX: (402) 441-8692
Email: lworrell@ci.lincoln.ne.us

Federal Agency Representative

(position vacant at time of report)

GIS Steering Committee Coordinator
Larry K. Zink
Intergovernmental Data Services Div. - DAS
521 S. 14th Street, Suite 101
Lincoln, Nebraska 68508
Voice: (402) 471-3206, FAX: (402) 471-3339
Email: lzink@doc.state.ne.us

APPENDIX C

Transportation Databases

Initial Assessment and Draft Report
Dick Genrich and Ed Kelley
Transportation Planning Division
Nebraska Department of Roads

1. Identify Primary Stakeholders

The Department of Roads has identified the primary stakeholders for transportation geo-spatial databases in Nebraska to include:

Federal Agencies:	Bureau of Indian Affairs, Federal Highway Administration, U.S. Army Corps of Engineers, U.S. Census Bureau, U.S. Forest Service, U.S. Geological Survey
State Agencies:	Natural Resources Commission, Dept. of Water Resources, Governor's Policy Research & Energy Office, State Patrol, Dept. of Aeronautics, Dept. of Economic Development, Public Service Commission, University of Nebraska, Dept. of Education, Game & Parks Commission, State Historical Society, Dept. of Motor Vehicles, E-911 System
Local Agencies:	County Highway Dept.'s, City Planning Dept.'s, E-911 Systems
Regional Agencies:	Regional Transportation Districts, Natural Resource Districts, Metropolitan Planning Organizations, Public Utilities
Private Companies:	Commercial Trucks, Engineering, Mapping, Surveying

2. Assess Current Status of Databases versus Perceived Need

The Department of Roads current status consists of a database featuring approximately 10,000 miles of digitized state maintained roadways in the state. In progress at the present time is the addition of approximately 20,000 miles of local road systems. There are also approximately 70,000 miles of county roads in Nebraska that will eventually have to be worked into the statewide system.

At least two perceived needs may be identified. One consists of databases for other linear features, including railroads, trails, barges, bus lines, and airports. Another perceived need deals with databases for polygon features, such as NDOR facilities, wetlands, right-of-way, potential properties, and other easements.

3. If warranted, draft proposal to develop recommendations to achieve objectives for this priority geo-spatial database category, by addressing the following issues:

a. Are there major deficiencies in the currently available database(s)? If so, what are they?

Yes. Deficiencies exist in the degree of accessibility, differences in scale and projection, and consistency in information provided.

b. Recommendations for groups to be included in a study subcommittee?

A core working group could be made up of the following primary stakeholders: City Planning Dept.'s, County Highway Dept.'s, State Patrol, Game & Parks Commission, Natural Resource Districts, Federal Highway Administration, local E-911 systems, and various internal divisions within the NDOR.

b. Are revised standards needed? In what areas?

Yes. It would be useful to ensure that consistent standards exist between state agencies (NDOR), local users of transportation data (city planning, county highway), and commercial providers (consultants, vendors) in the areas of scale, projection, and various applications.

d. Are there outstanding maintenance or integration needs to be addressed?

Yes, if NDOR is to be a repository of transportation data in Nebraska, then integration between state and local data processes needs to be reviewed.

e. Is there an estimated timeline required to define a proposed action plan to achieve objectives for this database category?

A timeline of at least three to four months will be required to address the goals of the Database Goal Objectives.

f. What anticipated resources are required to conduct this study?

Resources needed include a commitment of time to develop an agenda of goals, an effort to recruit members for a subcommittee/study group to meet those goals, and expenditures for telephone, mail, and minimal travel. Are they available? Yes.

Governmental Units Databases

Initial Assessment and Draft Report

Val Goodman
Legislative Computer Services

Governmental Units (boundaries) are required for a large number of public agencies (election clerks, municipal, local, regional, state, federal) as well as private corporations and in some academia disciplines for a wide range of applications. For example, applications include demographic analysis, research studies, political issues, determining funding, geocoding or address matching applications, location and regional analysis, historical studies and more.

1. Identify primary stakeholders in this particular priority database category.

After a preliminary survey was conducted the primary stakeholders identified for Governmental Units database ran the whole gambit from local government to private corporations. Those included all 93 county/local governments, cities, state or public agencies, legislature, federal agencies, academia, political parties, several private companies and non-profit organizations. Although incomplete, examples of primary stakeholders are shown in the table below.

County / Local Government	All 93 county governments, County Election Commissioners/Clerks, County Supervisors, Omaha City Council, City Governments
Education	University of Nebraska, University of Nebraska at Omaha, University of Nebraska at Kearney, Community Colleges, Omaha Lincoln, Millard, Bellevue Public Schools and other public schools, libraries,
State or Public Agencies	Nebraska Department of Education, Nebraska Department of Roads, Nebraska Natural Resources Commission, Department of Economic Development, Governor's Office, Secretary of State, Nebraska Department of Insurance, Nebraska Legislative Council, Public Service Commission, State Board of Education, State Board of Regents, Nebraska Supreme Court, Nebraska State Data Center , Nebraska Department of Labor, Nebraska Bar Association
Federal Agencies	United States Bureau of Census, Office of Budget and Management, FEMA, SAC, US Post Office, Library of Congress, Congress
Regional or Planning Agencies	Metropolitan Planning Agency, Omaha Public Power Districts, Rural Utility, Metropolitan Utilities Districts,
Non-Profit Organizations	Nebraska Arts Council, Citizens for Good Government, Nebraska Planned Parenthood
Private Corporations	Elections Data Services, Peter Kewitt Corporation, Mutual of Omaha, First Federal Bank of Omaha, First Federal Bank of Lincoln, US West, Cox Cable
Political Parties	Both local and national democratic and republican parties

2. Initial assessment of current status of database(s) versus perceived need.

In a preliminary investigation it was concluded that Governmental Units databases reach and effect all citizens of the State of Nebraska in various and numerous ways. Some of the current databases are available from selected agencies (e.g. TIGER\Line) and are used by several entities across Nebraska. Other databases, such as those created by redistricting by the Legislature, are in high demand from local to nation levels. A requirement for more Governmental Unit databases to be developed and coordinated needs to be thoroughly examined.

3. If it appears to be warranted, draft for the GIS Steering Committee's consideration a proposal for the creation of a subcommittee to develop recommendations for achieving the Database Goal objectives (see above) for this priority geospatial database category. Please address the following issues:

a. Are there major deficiencies in the currently available database(s)? In general, what are they?

Depending on the digital databases there are no central collection points. For example, the Secretary of State collects the voting precincts on paper and written description, but at this time does not the capacity for a GIS to create digital databases. Usually the digital database is first drawn on census maps by the local Election commissioner/clerk, sent to the US Bureau of Census and back to the State and the end of the decade. However, changes during the decade are not recorded.

In several instances these databases are only available on paper. Some county or local governments have GIS or are the process, but at this time it is more of an oddity than the norm.

b. Recommendations for groups that should be included in a study subcommittee?

A study subcommittee makeup should at least include the following:

Nebraska Legislative Council	Nebraska Department of Education
Secretary of State	League of Municipalities or City Official Representative
US Bureau of Census	Election Commissioner/Clerk
County Officials	Nebraska State Data Center

c. Are revised standards needed? In what areas?

Several of the databases have been developed using TIGER\Line from the United States Bureau of Census. These databases are at 1:100000 and are not the most accurate.

Many of the databases are only on paper. Thus, scale, resolution, accuracy and classifications are essential factors to be addressed.

d. Are there outstanding maintenance or integration needs to be addressed?

- All entities, for example (legislative, congressional, public service commission districts) that go through a redrawing of districts every ten years. This occurs at the local and state levels.
- US Bureau of Census updates TIGER\Line by contacting local and state agencies.
- Coordination of central collection points or specific agencies for primary databases
- Since several of these databases are on paper, time to transfer them to digital is going to be a major obstacle

- Attributes to be included in databases and how to coordinate.
- Policy issues on distribution

e. What is the estimated timeline that will be required to define a proposed action plan (for the Steering Committee's consideration) to achieve the Database Goal objectives for this database category?

About four to six months.

f. What are the anticipated resources that will be required to conduct this study? Are they available?

As always, time, human resources and funding are considerations for developing a Governmental Units databases study. Currently, the legislature has only one person to devote, although another person from research is a possibility. Another person(s) would be recommended to assist. Funding should be minimal, postage and maybe some travel.

g. Other important issues.

Below is a preliminary list of selected Governmental Units primary databases reviewed. There are several other Governmental Units at local and state levels that should be explored.

Legislative Districts	Congressional Districts
Public Service Commission	State Board of Education
Board of Regents	Supreme Court Judicial Districts
Voting Precincts or Wards	Municipalities - Cities/Villages
County	Nebraska School Districts
Township/Range	
Census Blocks	Census Block Groups
Census Tracts	Tribal Lands - Reservations
Minor Civil Divisions	
Nebraska Natural Resources Commission	Natural Resource Districts & Sub Districts
City Council Districts	Power Districts - Metropolitan Utilities Districts
County Supervisor Districts	Fire Districts
Game and Parks Districts	

Digital Orthophoto Database

Initial Assessment and Draft Report
Mahendra Bansal
Nebraska Natural Resources Commission

Background

A Digital Ortho-photo Quadrangle (DOQ) map is a digital image of an aerial photograph with image distortion removed, and corrected for aircraft pitch, yaw and altitude, landscape relief, and camera lens (optic correction) orientation. The ground features are, therefore, displayed in their true ground position. This allows for the direct measurement of distance, areas, angles and positions.

These DOQs are developed from NAPP (1993) flight coverage flown under the National Aerial Photography Program. The aerial photographs are exposed using 10-inch wide film at 20,000 feet above land surface, with 6 inch (152 millimeter) focal length camera, resulting in a 1:40000 scale image. The digital (scanned) image is rectified to orthographic projections by processing each image pixel through photogrammetric equations derived from photo-identifiable GPS ground control points, camera calibration from orientation parameters, and the digital elevation model database. The finished product is a spatially accurate image with identifiable features represented in their true planimetric positions. This digital image is a GIS product, which can be overlaid and manipulated like any other coverage or layer, and offers significant flexibility.

The USGS National Mapping Standards require 1-meter ground resolution for 3.75-minute quadrangle maps drawn to 1:12,000 scale using NAD83 horizontal controls and UTM projections, with coordinates in meters. Digital orthophoto quadrangles and quarter-quadrangles must meet horizontal National Map Accuracy Standards (NMAS) at 1:24,000 scale and 1:12,000 scale, respectively. The NMAS specify that 90 percent of the well-defined points tested must fall within 40 feet (1/50 inch) at 1:24,000 scale and 33.3 feet (1/30 inch) at 1:12,000 scale. The vertical accuracy of the source DEM must be equivalent to or better than a level-1 DEM, with a root-mean-square-error (RMSE) of no greater that 7 meters. The DOQ RMSE is the square root of the average of the squared discrepancies. These discrepancies are the differences in coordinate (x and y) values derived by comparing the data being tested with values determined during aerotriangulation or by an independent survey of higher accuracy. All remaining inputs and processes (e.g. aerotriangulation control and methodology, scanner and sensor calibrations) used in digital orthophoto production must be sufficiently accurate to ensure that the final product meets NMAS specifications.

Color infrared (CIR) photography may be used as a source. However, the resulting DOQ may either be a single black-and-white composite of all bands or a color DOQ with all three bands. Although NAPP is the primary image source, this does not prevent the use of additional aerial photographs or digital images in the future.

Orthophotos combine the image characteristics of a photograph with the geometric qualities of a map. They serve a variety of purposes, from interim maps to field references for earth science investigations and analyses. A digital orthophoto is useful as a GIS layer and as a tool for revision of topographic maps. The NRC's applications include digitization of soil surveys, land use, flood plain delineations, conservation practices, water resources planning, soil erosion assessments,

watershed analysis, environmental impact assessment, disaster analysis, forestry inventory, and other resources management activities.

1. Identify primary Stakeholders in this particular priority database category.

State Agencies:	Nebraska Natural Resources Commission, Property Tax Division, Dept. Revenue, Nebraska Game and Parks Commission, Department of Water Resources, Department of Roads, Department of Environmental Quality, Department of Agriculture, Nebraska Historical Society, Health and Human Services System, Nebraska Emergency Management Agency, Conservation and Survey Division, UNL, University of Nebraska, Extension, Board of Educational Lands and Funds, State Surveyor, Nebraska Forest Service
Federal Agencies	U.S. Geological Survey, U.S. Natural Resources Conservation Service, Federal Emergency Management Agency, U.S. Forest Service, U.S. Farm Service Agency, U. S. Center of Disease Control, U.S. Bureau of Land Management, U. S. Bureau of Reclamation, U.S. Bureau of the Census, U.S. Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Parks Service
Local Agencies	Natural Resources Districts, County Assessors, City/County Planning, County Surveyors, County Engineers, Cooperatives, Private Consultants, and Researchers, Landowners, Farmers and Ranchers

2. Initial assessment of current status of database versus perceived need.

Current Status: As of July 1, 1998, the NRC has developed 70 percent of DOQ coverage of Nebraska approximately, and expects to complete the entire state within the three year timeline ending June 1999. DOQs are developed using 1993 aerial photography, have a 1-meter ground sample distance (GSD), and meet National Map Accuracy Standards for a 1:12,000 map product.

Perceived need: Digital Orthophotography is used as a base map and background imagery for a number of mapping and planning initiatives including: SSURGO, cadastral mapping, land use mapping, wetland mapping, forestry mapping, watershed planning, forestry planning, whole farm and ranch planning, stream degradation studies, river basin studies, floodplain management, assistance and mitigation as well as natural resources project reviews and evaluations.

3. If it appears to be warranted, draft for the GIS Steering Committee's consideration a proposal for the creation of a subcommittee to develop recommendations for achieving the Database Goal objectives (see above) for this priority geospatial database category. Please address the following issues:

a. Are there major deficiencies in the currently available database? In general, what are they?

Since, these DOQs are developed for a 1:12,000 map product, they would lack resolution (spatial and spectral) and accuracy for scales larger than 1:12,000. A number of mapping and planning initiatives (i.e. urban), however, require larger scale DOQs. The 1993 NAPP DOQ product would not be current enough to provide information in those rapidly changing areas.

The current DOQs are available only as black and white images.

b. Recommendations for groups that should be included in a study subcommittee?

A study subcommittee to look into future DOQ database upgrades, whether grayscale or CIR, and for production of second generation DOQs should include various levels of government agencies and academia including the following:

County Assessors	U.S. Geological Survey/National Mapping Div.
County Surveyors	Representatives of NRDs and local government
County Engineers	State Surveyor
UNL/CALMIT	Nebraska Natural Resources Commission
Nebraska Department of Roads	USDA/Natural Resources Conservation Service
Nebraska Emerg. Management Agency	

c. Are revised standards needed? In what areas?

Yes. Standards exist for the current 1:12,000 DOQ products. New standards need to be developed for second generation digital orthophotography products proposed by new technologies.

d. Are there outstanding maintenance or integration needs to be addressed?

Provisions and costs for updating data, grayscale or color-infra-red (CIR), from 1999 and later NAPP flight coverages need to be identified.

New technologies (e.g., Softcopy photogrammetry) for the acquisition of CIR, 1:2,400 scale or better, digital orthophotography using low altitude flight coverages need to be tracked and evaluated.

e. What is the estimated timeline that will be required to define a proposed action plan (for the Steering Committee's consideration) to achieve the Database Goal Objectives for this database category?

The next NAP photography is scheduled for Spring 1999 for Nebraska. To update the database to Color-Infra-Red photo base, the following estimate for acquisition of 1999 NAPP photography is provided by the U.S. Geological Survey.

Nebraska	79,149 square miles/24,734 linear miles	
Color Infrared	$603,171	$7.62 per sq. mile
Black & White	$502,644	$6.35 per sq. mile

These estimates are procurement (flying season) sensitive, confidential and subject to negotiations with state cooperators. Flying season and rates may vary.

The other components in production of DOQs are: Additional GPS work; Aero-triangulation work; and scanning diapositives. This will require use of a high-resolution scanner, costing approximately $100,000; and use of softcopy photogrammetry technologies.

f. What are the anticipated resources that will be required to conduct this study? Are they available?

Coordination among state, federal and local participating agencies that need this database updated.

g. Other Issues:

For any questions, suggestions and comments, please contact the Nebraska Natural Resources Commission: Mahendra Bansal, 402-471-3964, FAX: (402) 471-3132.

Elevations Database

Initial Assessment and Draft Report
Mahendra Bansal
Nebraska Natural Resources Commission

Background

The Digital Elevation Model (DEM) database is a digital representation of hypsographic (topographic contour) information stored in a raster form. A DEM consists of a sampled array of elevations for a number of ground positions that are usually spaced at regular intervals, and the arrays are referenced horizontally in the Universal Transverse Mercator (UTM) projection coordinate system of the North American Datum of 1927 (NAD 27). The elevation units are in feet or meters above mean sea level relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). The data are ordered from south to north in profiles, and from west to east in a profile. A profile is a one-dimensional data array of rows and columns organized sequentially in fixed or variable length format.

The DEM database generated by the Nebraska Natural resources Commission in cooperation with the U. S. Geological Survey consists of Level-2 DEMs based on 30- by 30- meter data spacing derived from 7.5 minute, 1:24,000, topographic quadrangle map series for Nebraska.

Level-2 classification of DEMs are elevation data sets that have been processed or smoothed for consistency and edited to remove identifiable systematic errors. The Level-2 DEMs are created by optical scanning of 1:24,000 scale hypsography separates using image processing techniques. These hypsography separates or digital line graphs (DLG) consists of contour line coverage mapped at 10-feet intervals. In Level-2 category, a root-mean-square-error (RMSE) of one-half contour interval is maximum permitted. The RMSE is determined for linearly interpolated elevations in the DEM and corresponding "true" elevations of test (GPS) points which are well distributed and are representative of the terrain. These test points are located on contour lines, benchmarks, or spot elevations. A minimum of 28 test points (20 interior and 8 edge points) is used per DEM for calculation of RMSE and to check for accuracy and quality control purposes.

The Elevation Database is used in watershed planning, forestry planning, whole farm and ranch planning, stream degradation studies, river basin studies, flood plain management, and project reviews and evaluations. The DEMs are also used in the creation of watershed boundaries, stream networks, and various hydrologic modeling applications.

1. Identify primary Stakeholders in this particular priority database category.

State Agencies	Nebraska Natural Resources Commission, Department of Water Resources, Department of Roads, Department of Environmental Quality, Nebraska Emergency Management Agency, Conservation and Survey Division - UNL, State Surveyor, Nebraska Forest Service
Federal Agencies	U.S. Geological Survey, U.S. Natural Resources Conservation Service, Federal Emergency Management Agency, U. S. Bureau of Reclamation, U.S. Corps of Engineers, U.S. Environmental Protection Agency, U.S. Parks Service
Local Agencies	Natural Resources Districts, County Surveyors, County Engineers, Private Consultants, and Researchers

2. Initial assessment of current status of database versus perceived need.

Current Status: As of July 1, 1998, the NRC has developed 75 percent of DEM coverage of Nebraska approximately, and expects to complete the entire state within the three year timeline ending June 1999. DEMs developed by NRC provide elevation data at 30 meter postings and meet the standards for level 2 Digital Elevation Models.

Perceived Need: Digital elevation data is used for watershed planning, forestry planning, whole farm and ranch planning, stream degradation studies, river basin studies, floodplain management, assistance and mitigation as well as natural resources project reviews and evaluations.

3. If it appears to be warranted, draft for the GIS Steering Committee's consideration a proposal for the creation of a subcommittee to develop recommendations for achieving the Database Goal objectives (see above) for this priority geospatial database category. Please address the following issues:

a. Are there major deficiencies in the currently available database? In general, what are they?

- The DEMs are derived from USGS 1:24,000 contour maps some of which are 40+ years old. The contour maps are not current, detailed, or accurate enough for modern needs;
- 30-meter resolution is too coarse for some needs.
- Elevation information in areas of low relief is inadequate for detailed floodplain studies.
- Elevation information is inadequate for the development of high-resolution digital orthophotography.
- Elevation information is inadequate to support development and maintenance of the NRCS SSURGO database.

b. Recommendations for groups that should be included in a study subcommittee?

A study subcommittee should include all levels of government and academia including the following. Since development of DEMs and production of DOQs are complementary, one sub-committee should handle both databases.

County Surveyors	Representatives of NRDs and local government
County Engineers	Nebraska Natural Resources Commission
UNL/CALMIT	USDA/Natural Resources Conservation Service
State Surveyor	U.S. Geological Survey/National Mapping Division

c. Are revised standards needed? In what areas?

Yes. Standards exist for the current 1:24,000 elevation products. New standards need to be developed for development and resulting accuracy of elevation data acquired by new technologies.

d. Are there outstanding maintenance or integration needs to be addressed?

- Provisions and costs for updating data need to be identified.
- New technologies (e.g., Digital Terrain Model, Auto-correlation or softcopy photogrammetry techniques, SAR, forthcoming high-resolution satellites) for the acquisition of 1-foot and 2-feet hypsography and digital elevation data need to be tracked and evaluated.

e. What is the estimated timeline that will be required to define a proposed action plan (for the Steering Committee's consideration) to achieve the Database Goal Objectives for this database category?

Nothing proposed at this time. The next generation of DEMs would require hypsography generated at 1-foot to 2-feet intervals. This will require use of advanced softcopy photogrammetry technologies, Digital Terrain Model (DTM), and other methodologies.

f. What are the anticipated resources that will be required to conduct this study? Are they available?

Coordination among state, federal and local agencies who need this database revised or updated.

g. Other Issues:

For any questions, suggestions and comments, please contact the Nebraska Natural Resources Commission: Mahendra Bansal, 402-471-3964, FAX: (402) 471-3132

Hydrology Databases

Initial Assessment and Draft Report
Mahendra Bansal and Rich Kern
Nebraska Natural Resources Commission

Background

Watershed boundaries had been delineated by several state and federal agencies over the years but no attempt was made in the early stages to coordinate these boundaries. The Nebraska Natural Resources Commission contacted all of those agencies known to delineate watersheds and coordinated an effort to combine these delineations into one GIS database. These agencies included the Nebraska Natural Resources Commission, Game and Parks Commission, Department of Water Resources, Department of Environmental Quality, Conservation and Survey Division/UNL, U.S. Geological Survey, and U.S. Natural Resources Conservation Service. A meeting of all of the interested parties was held to discuss accuracy, QA/QC, projections, and procedures.

As part of the process, one stream reach for each delineated watershed was also digitized. The GIS database created as a result of this process is referred to as the Major Streams of Nebraska. Upstream and downstream linkages were defined and each stream was linked to its appropriate watershed to allow tracking the flow of watershed runoff. Locations of stream flow gaging stations are also identified.

The results of the project had been reviewed by all participating organizations. Through cross-correlation tables, all watershed boundaries can be plotted individually or combined.

1. Identify primary Stakeholders in this particular priority database category.

State Agencies	Nebraska Natural Resources Commission, Nebraska Game and Parks Commission, Department of Water Resources, Department of Environmental Quality, Nebraska Emergency Management Agency, Conservation and Survey Division, UNL, State Surveyor, Nebraska Forest Service
Federal Agencies	U.S. Geological Survey, U.S. Natural Resources Conservation Service, Federal Emergency Management Agency, U.S. Forest Service, U.S. Farm Service Agency, U.S. Bureau of Land Management, U. S. Bureau of Reclamation, U.S. Bureau of the Census, U.S. Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service
Local Agencies	Natural Resources Districts, County Assessors, City/County Planning, County Surveyors, County Engineers, Cooperatives, Private Consultants, and Researchers, Landowners, Farmers and Ranchers

2. Initial assessment of current status of database versus perceived need.

Current Status: The NRC has developed Hydrologic Units (Watersheds), and Major Streams databases (coverages) of Nebraska, which were digitized from the USGS 7.5 minute topographic paper maps.

Perceived Need: The Hydrology coverages are used for watershed planning, forestry planning, whole farm and ranch planning, stream degradation studies, river basin studies, flood plain management, assistance and mitigation as well as natural resources project reviews and evaluations. The NRC in consultation with NRCS, DEQ, G&P, DWR, and USGS completed this comprehensive watershed coverage. As part of this process, a Major Streams coverage was also created that relates to the watersheds. Water surface elevations are part of the attributes of this coverage.

3. If it appears to be warranted, draft for the GIS Steering Committee's consideration a proposal for the creation of a subcommittee to develop recommendations for achieving the Database Goal objectives for this priority geospatial database category. Please address the following issues:

a. Are there major deficiencies in the currently available database? In general, what are they?

- The watersheds were delineated from USGS 1:24,000 contour paper maps, some of which are 40+ years old.
- In a few cases that scale of map was not available and others (up to 1:500,000 in adjacent states) were substituted.
- The data is considered accurate within 50 meters in Nebraska with lesser accuracy in the surrounding states.

b. Recommendations for groups that should be included in a study subcommittee?

No additional study is required at this time.

c. Are revised standards needed? In what areas?

No additional study is required until higher quality maps become available.

d. Are there outstanding maintenance or integration needs to be addressed?

As additional delineations are identified, NRC coordinates with the requesting agency to make the needed modifications. No additional funds or technologies are needed for any maintenance issues.

e. What is the estimated timeline that will be required to define a proposed action plan (for the Steering Committee's consideration) to achieve the Database Goal objectives for this database category?

This is a completed project.

f. What are the anticipated resources that will be required to conduct this study? Are they available?

None

g. Other Issues:

For any questions, suggestions and comments, please contact the Nebraska Natural Resources Commission: Mahendra Bansal, 402-471-3964, Rich Kern, 402-471-3948, FAX: (402) 471-3132.

Land Cover and Land Use Databases

Initial Assessment and Draft Report
James W. Merchant, Michael Daggy and Brian Putz
Conservation and Survey Division
University of Nebraska-Lincoln

Background

Land cover and/or land use data are required by a large number of Nebraska public agencies (municipal, local, regional, state, federal) at various scales and spatial resolutions. Such data are needed for a wide range of applications including, among others, wildlife habitat assessment, conservation planning, emergency preparedness and response, water quality assessment, property valuation and appraisal, and municipal and county planning and zoning.

Land use and land cover are distinctly different and are best presented as two separate databases. ***Land cover*** is defined as the type of material that covers the earth's surface at a specific location at a specific time. ***Land use*** is the manner in which human beings utilize a specific tract of the earth's surface. As an example, the land use in an area might be cropland, but the land cover at a specific location within this area of cropland might be wheat, corn, soybeans, bare soil, grass or even trees (as in a windbreak). In an area of single-family residential land use, the land cover at a specific location might be asphalt, concrete, grass or trees. Note that land cover may change dramatically over short periods of time. For example, a field that had a land cover of wheat in May might be bare soil in August. The land use will not have changed during this period.

Land use and land cover mapping can be accomplished through field (GPS-based) surveys, air photo (e.g., DOQQ) interpretation and satellite image analysis. The level of spatial and classificatory detail obtainable, accuracy, cost and temporal currency of products developed will vary with the data analysis methodology used and the skills and experience of data analysts. The appropriate selection of methodology is driven by user requirements and funding available. In general, costs for land cover and land use mapping will increase in direct proportion to requirements for higher spatial, classificatory and temporal resolution.

1. Identify primary stakeholders in this particular priority database category

A very preliminary survey we conducted identified at least 54 units or individuals within Nebraska agencies or institutions (local, county, regional, federal, NGO, academic) that require land use and/or land cover data. There are at least 13 agencies or institutions that currently produce land cover and/or land use data for some part of the state on at least an occasional basis. However, the areas covered and the spatial and classificatory detail of the efforts vary widely. Most efforts are carried out to address an immediate requirement or project, often with grant funds or other funding of limited scope and duration. No statewide land use or land cover mapping is currently conducted on a regular basis.

Users or Potential Users of Land Use and/or Land Cover Data

UNL/Conserv. and Survey Div./CALMIT	Nebraska Dept. of Environmental Quality
Nebraska Game and Parks Commission	Nebraska Dept. of Water Resources
Nebraska Dept. of Roads	Nebraska Dept. of Revenue – Property Tax Div.

Nebraska Natural Resources Commission
Upper and Lower Platte NRD Alliances
Professor Tom Franti, UNL
Cities of Omaha, Lincoln, Grand Island, Fremont and Scottsbluff
U.S. Bureau of Reclamation
Army Corps of Engineers
USGS / National Mapping Division
USDA / Natural Resources Conserv. Service
All Natural Resource Districts
Central Nebraska Public Power District
Counties of Hall, Lancaster, and Scotts Bluff
Audubon Nebraska
The Nature Conservancy
EPA Region VII
U.S. Fish and Wildlife Service
U.S. National Park Service

Current Producers of Land Use or Land Cover Data

UNL/CALMIT
Professor Tom Franti, UNL
Grand Island Public Works Department
Scotts Bluff County
Army Corps of Engineers
U.S. National Park Service
U.S. Fish and Wildlife Service
Nebraska Natural Resources Commission
The Nature Conservancy
City of Lincoln/Lancaster Planning Department
City of Fremont Engineering Department
USDA / Natural Resources Conservation Service
USGS / National Mapping Division

2. Initial assessment of current status of database(s) versus perceived need

Because requirements for land use and land cover data vary widely, and because land cover and land use change frequently, no single land cover and/or land use data base will ever satisfy all users' needs. Users require data at differing scales, differing spatial resolutions, and having differing classification systems. Some users can tolerate data that are several years old, others need more current data (although such data are rarely obtainable at present).

At a local scale (e.g., Lincoln) efforts to obtain land use and land cover data are sometimes viewed as adequate; however, such local efforts are very rare in Nebraska and most local units of government are not able to fund detailed up-to-date land use or land cover surveys. At regional and state-wide scales, land cover and land use data are being prepared by UNL/CALMIT to support GAP analysis and selected other projects, but these data will meet only a few needs and will quickly become dated. There is little if any intergovernmental coordination on land use or land cover database development in Nebraska, which means that locally-developed databases could not, in any case, be aggregated spatially or categorically to provide statewide coverage at present.

Procedures for accuracy assessment are poorly understood, and land use/land cover databases developed in Nebraska are currently infrequently checked for accuracy.

There are currently many misconceptions and inconsistencies in the development of land use and land cover maps for Nebraska. Education is needed on topics such as classification systems, data standards (e.g., FGDC and American Planning Association standards) for land use and land cover mapping, advantages and disadvantages of alternative methods for developing land use and land cover data, and methods for accuracy assessment.

3. If it appears to be warranted, draft for the GIS Steering Committee's consideration a proposal for the creation of a subcommittee to develop recommendations for achieving the Database Goal objectives (see above) for this priority geospatial database category. Please address the following issues:

a. Are there major deficiencies in the currently available database(s)? In general, what are they?

There are clearly deficiencies in currently available land use and land cover data. These include:

- land use and land cover data, where any exists, are often old (5-10+ years), or of insufficient spatial or categorical resolution to be optimally useful;
- not all data are produced in digital ("GIS") format;
- data are often difficult to access;
- intergovernmental and inter-institutional coordination and cost sharing is almost totally lacking;
- education is required (see above)

b. Recommendations for groups that should be included in a study subcommittee?

A study subcommittee should include all levels of government and academia including at least the following:

UNL/CALMIT
Nebraska Dept. of Revenue/PTD
Nebraska Dept. of Environmental Quality
USDA/Natural Resources Conservation Service
Representatives of NRDs and local government
Nebraska Game and Parks Commission
Nebraska Dept. of Water Resources
Nebraska Natural Resources Commission
U.S.G.S./National Mapping Division

c. Are revised standards needed? In what areas?

Yes. Both FGDC and the American Planning Association (and probably others) have developed standards for land cover and/or land use mapping at certain scales. Most Nebraska agencies appear to be using self-determined standards (if any). Standards for mapping need to be developed for different scales and applications.

d. Are there outstanding maintenance or integration needs to be addressed?

- ideally land use and land cover databases should be developed in such a way that they can be nested categorically and spatially
- provisions and costs for updating data need to be identified
- new technologies (e.g., forthcoming high-resolution satellites) for developing land use and land cover data need to be tracked and evaluated
- no single land use and/or land cover database can be expected to fill all possible needs; special needs will arise for land use and land cover data from time to time - examples include special groundwater protection projects, issues related to hog confinements and feedlots, dam re-licensing, law suits between Nebraska and neighboring states

e. What is the estimated timeline that will be required to define a proposed action plan (for the Steering Committee's consideration) to achieve the Database Goal objectives for this database category?

at least 4-6 months

f. What are the anticipated resources that will be required to conduct this study? Are they available?

- commitments of staff time for meetings, document review, surveys;
- costs for phone, mail, travel (should be minimal)

Soils Database

Initial Assessment and Draft Report
Mahendra Bansal and Wayne Vanek
Nebraska Natural Resources Commission

Background

Soils information includes a description of soils and their location in the survey area. It forms the basis for discussion of its suitability, limitations, and management of soils for specified uses. Soil scientists observed the steepness, length and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept or model of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape. To construct a soil map, the soil scientist must determine the boundaries between the soils. He records the characteristics of the soil profiles, and also notes the soil color, texture, size and shape of soil aggregates. After describing the soils in the survey area and determining their properties, the soil scientist assigns the soils to taxonomic classes (units). After soil scientists located and identified the significant natural bodies of soil in the survey area, the boundaries are drawn on aerial photographs and are each identified as a specific map unit. A map unit delineation on a soil map thus represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils.

SSURGO Database

The Soil Survey Geographic (SSURGO) Database is basically the digitized published county soil survey information compiled on a stable-base (1993 DOQs) at a scale of 1:12,000. Digitized soils map and corresponding attribute and tabular data are required by a large number of local, county, state, and federal agencies, as well as private, consulting, and farm management agencies. Such data are needed for a wide range of applications such as, farm conservation planning, precision farming, wildlife habitat assessment, water quality assessment, property valuation and appraisal, municipal and county planning and zoning, and much more.

SSURGO is defined, according to the National Soils Handbook glossary as "The most detailed soil geographic data base, and consists of map, metadata, and a soils database, which gives the proportionate extent of the component soils and their properties for each map unit."

1. Identify primary Stakeholders in this particular priority database category.

State Agencies	Nebraska Natural Resources Commission, Property Tax Division, Department of Revenue, Department of Water Resources, Department of Roads, Department of Environmental Quality, Department of Agriculture, Nebraska Emergency Management Agency, Conservation and Survey Division, UNL, University of Nebraska, Extension, Nebraska Forest Service

Federal Agencies	U.S. Geological Survey, U.S. Natural Resources Conservation Service, Federal Emergency Management Agency, U.S. Forest Service, U.S. Farm Service Agency, U. S. Bureau of Reclamation, U.S. Corps of Engineers, U.S. Environmental Protection Agency, U.S. Parks Service
Local Agencies	Natural Resources Districts, County Assessors, City/County Planning, County Surveyors, Cooperatives, Landowners, Farmers and Ranchers, Private Consultants and Researchers, All Taxpayers of Nebraska

2. **Initial assessment of current status of database versus perceived need.**

Current Status: As of July 1, 1998, 16 counties were digitized. Two counties (Dundy and Pawnee counties) are SSURGO certified and the remaining 14 counties are awaiting certification.

Perceived Need: The need is for dramatic acceleration of 12 counties in the Republican River Basin, and for acceleration of 12 additional counties in the Platte River Corridor.

3. If it appears to be warranted, draft for the GIS Steering Committee's consideration a proposal for the creation of a subcommittee to develop recommendations for achieving the Database Goal objectives (see above) for this priority geospatial database category. Please address the following issues:

a. Are there major deficiencies in the currently available database? In general, what are they?

- County soil surveys from which the digital data is derived ranges in age from modern to 40+ years.
- Soil map units and interpretations do not match across county lines.
- Mapping scale, resolution, and accuracy may be inadequate for modern requirements.
- Precision and accuracy of spatial and tabular data are inconsistent.

b. Recommendations for groups that should be included in a study subcommittee?

A study subcommittee should include various levels of government and academia and selected individuals from the private sector including the following:

Conservation and Survey Division, UNL	Nebraska Game and Parks Commission
Nebraska Natural Resources Commission	Nebraska Dept. of Revenue/Property Tax Division
Representatives of NRDs	Natural Resources Conservation Service, USDA
County Engineers and Assessors	Crop Consultants
Fertilizer Dealers	Farmers and Ranchers

c. Are revised standards needed? In what areas?

No. The Natural Resources Conservation Service has developed standards for the Soil Survey Geographic Database (SSURGO). FGDC Standards have been incorporated. These standards are being revised as necessary.

d. Are there outstanding maintenance or integration needs to be addressed?

- Provisions and costs for updating data need to be identified.
- New technologies (e.g., use of DEMs, DOQs, forthcoming high-resolution satellites) for updating soil surveys need to be tracked and evaluated.

e. What is the estimated timeline that will be required to define a proposed action plan (for the Steering Committee's consideration) to achieve the Database Goal Objectives for this database category?

The current timeline is to complete the statewide SSURGO database by year 2002. To accelerate the process, it would require additional manpower to recompile, digitize and process the county soil surveys.

f. What are the anticipated resources that will be required to conduct this study? Are they available?

Coordination among NRC, NRCS and CSD, and other user and participating agencies who need this database accelerated.

Other Issues:

For any questions, suggestions and comments, please contact the Nebraska Natural Resources Commission: Mahendra Bansal, 402-471-3964, Wayne Vanek, 402-471-2797, FAX: (402) 471-3132

Geodetic Control Database

Initial Assessment and Draft Report

James L. Brown
State Surveyor

1. Identify primary Stakeholders in this particular priority database category

This data set is for geodetic control monuments and data. The primary stakeholders in this database include all groups doing high accuracy geodetic surveying. This usually does not include groups using GPS for map quality collection. Map quality users generally do not use the surveying monuments but rely upon other sources for referencing such as GPS base stations and maps.

The stakeholders in Nebraska include, but are not limited to, National Geodetic Survey (N.O.A.A.), Nebraska Department of Roads, Nebraska Natural Resources Commission, Nebraska State Surveyor, County Surveyors, and Registered Land Surveyors. It is difficult to accurately identify all stakeholders because geodetic surveying is not regulated in the same manner as Land Surveying.

2. Initial assessment of current status of database(s) versus perceived need

The current data set is somewhat fragmented. N.G.S. provides information on all control, which has been submitted, for inclusion in their data. This information is disseminated in many forms including optical discs. Individual agencies such as D.O.R., N.R.C. and County Surveyors maintain records of monuments not submitted for inclusion in the N.G.S. set. In some cases this information is difficult to locate and not available in digital form.

The creation of a database for geodetic control monuments, beyond that maintained by N.G.S. may not be a good idea at this time. The use of GPS for survey quality geodetic control is increasing as accuracy improves and cost declines. Users of GPS do not have the same requirements as those who employ conventional surveying methods. Conventional surveying methods require control monuments to be reasonably close to the work area (usually 5 kilometers or less). Survey quality GPS methods extend this range considerably to a point where the monuments contained within the N.G.S. data are usually adequate. Local counties who have enacted zoning ordinances requiring geo-referencing for new subdivisions have a need for control beyond that provided by N.G.S. Many Land Surveyors do not have GPS capability and make the connections by conventional survey methods. In the case of Lancaster County, the County Surveyor has improved the density of the control and makes it available to the public.

3. If it appears to be warranted, draft for the GIS Steering Committee's consideration a proposal for the creation of a subcommittee to develop recommendations for achieving the Database Goal objectives for this priority geospatial database category. Please address the following issues:

a. Are there major deficiencies in the currently available database(s)? In general, what are they?

A subcommittee to study the issue might be productive but the issue is not presenting a problem at this time and the need will decline even further as GPS becomes more widely used.

b. Recommendations for groups that should be included in a study subcommittee?

If a subcommittee is determined to be advisable then the N.G.S., D.O.R., S.S.O. and County Surveyors should be included.

c. Are revised standards needed? In what areas?

Standards for accuracy are covered by N.G.S. standards and data format should be compatible with current N.G.S. practices so no new standards should be required.

d. Are there outstanding maintenance or integration needs to be addressed?

The centralization of this data set may require legislative action to force reporting of monuments placed by non-participating organizations. Current N.G.S. practices are for voluntary participation and do not allow most data sets to be included.

e. What is the estimated timeline that will be required to define a proposed action plan (for the Steering Committee's consideration) to achieve the Database Goal objectives for this database category?

Due to the limited scope and participation I do not believe the action plan should be difficult to construct and could be in place in less than one year.

f. What are the anticipated resources that will be required to conduct this study? Are they available?

Because most of the players in this field are funded by the public they should be able to participate and no further funding should be required, beyond participation by Larry Zink.

Public Land Survey Database

Initial Assessment and Draft Report

James L. Brown
State Surveyor

1. Identify primary Stakeholders in this particular priority database category

The primary stakeholders for the P.L.S. database are all those involved in or planning involvement in, data sets, which pertain to property ownership. Property ownership in Nebraska is directly and inseparably connected to the P.L.S. The obvious and perhaps largest stakeholders are the local and state government entities involved in taxation of real property. Although there are other and numerous stakeholders for the P.L.S. database, those involved in real property taxation have the greatest requirements both in use and accuracy. These stakeholders include, but are not limited to, County Assessors, County Surveyors, Registers of Deeds, County Treasurers and Nebraska Property Tax Administrator.

2. Initial assessment of current status of database(s) versus perceived need

Currently the P.L.S. data set is fragmented and dependent upon efforts of local government bodies. Lancaster County is creating an exemplary data set based upon Global Positioning of located monuments. Other counties have made attempts to create this data set and in many cases the existence of the data sets is only known by these local officials. The Bureau of Land Management (B.L.M.) and Nebraska Natural Resources Commission (N.R.C.) have digitized the locations of most of the section corners from the 7.5 minute quadrangle sheets. These digitized databases have been compared and the consolidated result is maintained by B.L.M. This digitized data set is not adequate in quality or quantity for tax assessment purposes. A considerable volume of information on the existence of P.L.S.S. corners exists in County Surveyor records and the State Survey Records Repository but very little of it is geo-referenced.

The GIS Steering Committee, in 1997, authorized a pilot project for development in 4 counties. This pilot project attracted numerous partners and is still in progress. This pilot project should help develop strategies for development of this data set.

This data set must be developed and maintained at county level whenever possible because of the statutory responsibilities of the county officers including County Surveyor, County Assessor, County Clerk, County Treasurer and Register of Deeds. All of these offices and the State Surveyors Office share some statutory responsibility in the maintenance of P.L.S. information.

Standards are needed in the area of naming convention, accuracy, reference system, and methodology. These issues are being addressed in the pilot project.

The GIS Steering Committee pilot project should be completed in the next few months and provide information to construct an action plan to achieve the desired results. The resources to provide this action plan have been located and allocated by the pilot project.

3. If it appears to be warranted, draft for the GIS Steering Committee's consideration a proposal for the creation of a subcommittee to develop recommendations for achieving the Database Goal objectives for this priority geospatial database category. Please address the following issues:

I do not believe additional study groups or subcommittees would be beneficial at this time. Appropriations provided to the State Surveyors Office within LB 924 were earmarked for assisting local governments in geo-referencing efforts. The development of the PLSS database is an elementary component of this service. The State Surveyors Office is currently adding staff, redirecting and reallocating resources to meet this challenge

The major difficulty in this data set, beyond collection, is maintenance. About 300 registered land surveyors in Nebraska are collecting information on this set daily. This information is received and recorded by local county officers and the State Survey Record Repository but is not in standard form and often is not geo-referenced. Statute revisions may be necessary to correct these deficiencies.

There are major deficiencies in the data set but a study subcommittee could not address these issues adequately without information generated by the pilot project. I do not believe the GIS Steering Committee should allocate additional resources to this data set until the pilot project is completed.

APPENDIX D

Resolution Creating an Advisory Committee on Transportation Databases

Nebraska GIS Steering Committee

Whereas: The Nebraska GIS Steering Committee is charged with establishing guidelines and policies for statewide Geographic Information Systems and priority databases, and authorized to establish advisory committees from various levels of government, industry, or the general public pursuant to Sections 81-2604 and 81-2603, R.R.S. 1943.

Whereas: Transportation databases have been determined to be priority databases for development by the Nebraska GIS Steering Committee,

Whereas: Transportation databases have been determined by the Federal Geographic Data Committee (FGDC) to be a Framework Database because their use by a wide cross-section of geospatial data users,

Whereas: The Nebraska GIS Steering Committee has communicated to the FGDC its desire to take "a leading role, for the geographic area of Nebraska, in working with the FGDC, and other entities, to facilitate the development of framework geospatial data sets for the geographic area of Nebraska, and to define workable solutions to the proposed roles of Area Integrator, Data Production, and Data Distribution, as they relate to framework data sets for the geographic area of Nebraska."

Whereas: A Database Goal to, "Actively coordinate the development, maintenance, and distribution of priority statewide digital geospatial databases," is one of five long-range goals adopted by the Steering Committee, and discussions related to an Initial Assessment Report have indicated an interest in further development of these databases.

Now Therefore, be it resolved:

Section 1. That the Nebraska GIS Steering Committee creates an Advisory Committee on Transportation Databases to study and make recommendations on issues related to the development and maintenance of these geospatial databases for the geographic area of Nebraska.

Section 2. The Nebraska Department of Roads will act as the lead agency to provide the primary support for facilitating the convening, chairing, and provision of administrative support for this Advisory Committee.

Section 3. In formulating its recommendations, the Advisory Committee will solicit either the direct involvement of, or input from agencies and other interest groups that make significant use of these databases, to include at least the following:

City Planning Departments	County Highway Departments	State Patrol
Nebr. Game & Parks Comm.	Federal Highway Administration	Local E-911 Systems
Nebr. Dept. of Roads Divisions		

Section 4. Pursuant to the objectives outlined in the Database Goal adopted by the GIS Steering Committee this Advisory Committee is charged with reporting to the Steering Committee on the following areas relative to Nebraska geospatial transportation databases:

a) an assessment of the current status of each designated database, relative to the perceived short and intermediate-term needs;
b) an exploration of issues such as the range of likely users, current database completeness, accuracy, and the adequacy of current standards;
c) recommendations for how any necessary database development efforts should be undertaken, including possible responsible agencies and funding; and
d) recommendations related to database management issues, such as maintenance, integration, and distribution.

Section 5. The Advisory Committee's existence commences when this resolution is passed and concludes one year later. The GIS Steering Committee may extend the duration of the Advisory Committee.

Resolution Creating an Advisory Committee on Governmental Units Databases

Nebraska GIS Steering Committee

Whereas: The Nebraska GIS Steering Committee is charged with establishing guidelines and policies for statewide Geographic Information Systems and priority databases, and authorized to establish advisory committees from various levels of government, industry, or the general public pursuant to Sections 81-2604 and 81-2603, R.R.S. 1943.

Whereas: Governmental Units databases have been determined to be priority databases for development by the Nebraska GIS Steering Committee,

Whereas: Governmental Units databases have been determined by the Federal Geographic Data Committee (FGDC) to be a Framework Database because their use by a wide cross-section of geospatial data users,

Whereas: The Nebraska GIS Steering Committee has communicated to the FGDC its desire to take "a leading role, for the geographic area of Nebraska, in working with the FGDC, and other entities, to facilitate the development of framework geospatial data sets for the geographic area of Nebraska, and to define workable solutions to the proposed roles of Area Integrator, Data Production, and Data Distribution, as they relate to framework data sets for the geographic area of Nebraska."

Whereas: A Database Goal to, "Actively coordinate the development, maintenance, and distribution of priority statewide digital geospatial databases," is one of five long-range goals adopted by the Steering Committee, and discussions related to an Initial Assessment Report have indicated an interest in further development of these databases.

Now Therefore, be it resolved:

Section 1. That the Nebraska GIS Steering Committee creates an Advisory Committee on Governmental Units Databases to study and make recommendations on issues related to the development and maintenance these geospatial databases for the geographic area of Nebraska.

Section 2. The Office of the Clerk of the Legislature will act as the lead agency to provide the primary support for facilitating the convening, chairing, and provision of administrative support for this Advisory Committee.

Section 3. In formulating its recommendations, the Advisory Committee will solicit either the direct involvement of, or input from agencies and other interest groups that make significant use of these databases, to include at least the following:

Nebraska Legislative Council	Nebraska Dept of Education	Secretary of State
League of Municipalities	City Officials Representatives	US Bureau of Census
Election Commissioner/Clerk	County Officials	Nebraska State Data Center

Section 4. Pursuant to the objectives outlined in the Database Goal adopted by the GIS Steering Committee this Advisory Committee is charged with reporting to the Steering Committee on the following areas relative to Nebraska geospatial Governmental Units databases:

a) an assessment of the current status of each designated database, relative to the perceived short and intermediate-term needs;
b) an exploration of issues such as the range of likely users, current database completeness, accuracy, and the adequacy of current standards;
c) recommendations for how any necessary database development efforts should be undertaken, including possible responsible agencies and funding; and
d) recommendations related to database management issues, such as maintenance, integration, and distribution.

Section 5. The Advisory Committee's existence commences when this resolution is passed and concludes one year later. The GIS Steering Committee may extend the duration of the Advisory Committee.

Resolution Creating an Advisory Committee on Orthoimagery and Elevation Databases

Nebraska GIS Steering Committee

Whereas: The Nebraska GIS Steering Committee is charged with establishing guidelines and policies for statewide Geographic Information Systems and priority databases, and authorized to establish advisory committees from various levels of government, industry, or the general public pursuant to Sections 81-2604 and 81-2603, R.R.S. 1943.

Whereas: Digital Orthoimagery and Elevation databases have been determined to be priority databases for development by the Nebraska GIS Steering Committee,

Whereas: Orthoimagery and Elevation database have been determined by the Federal Geographic Data Committee (FGDC) to be Framework Databases because of their use by a wide cross-section of geospatial data users,

Whereas: The Nebraska GIS Steering Committee has communicated to the FGDC its desire to take "a leading role, for the geographic area of Nebraska, in working with the FGDC, and other entities, to facilitate the development of framework geospatial data sets for the geographic area of Nebraska, and to define workable solutions to the proposed roles of Area Integrator, Data Production, and Data Distribution, as they relate to framework data sets for the geographic area of Nebraska."

Whereas: A Database Goal to, "Actively coordinate the development, maintenance, and distribution of priority statewide digital geospatial databases," is one of the Steering Committee's five long-range goals, and an Initial Assessment Report and related discussions have indicated an interest in further development of these databases.

Now Therefore, be it resolved:

Section 1. That the Nebraska GIS Steering Committee creates an Advisory Committee on Orthoimagery and Elevation Databases to study and make recommendations on issues related to the development and maintenance of these geospatial databases for the geographic area of Nebraska.

Section 2. The Nebraska Natural Resources Commission will act as the lead agency to provide the primary support for facilitating the convening, chairing, and provision of administrative support for this Advisory Committee.

Section 3. In formulating its recommendations, the Advisory Committee will solicit either the direct involvement of, or input from agencies and other interest groups that make significant use of these databases, to include at least the following:

Fed. Emerg. Mgmt. Agency	County Surveyors.	County Engineers
USGS - Mid-Cont. Mapping Ctr.	Conserv. & Survey Div.-UNL	Nebr. Natural Res. Districts
Nebr. Natural Resources Comm.	Nebr. Department of Roads	State Surveyor
USDA-Nat. Res. Conserv. Serv.	Nebr. Emerg. Mgmt. Agency	County Assessors
US Army Corps or Engineers	US Environ. Protection Ag.	U.S. Parks Service

Section 4. Pursuant to the objectives outlined in the Database Goal adopted by the GIS Steering Committee this Advisory Committee is charged with reporting to the Steering Committee on the following areas relative to Nebraska geospatial Orthoimagery and Elevation databases:

a) an assessment of the current status of each designated database, relative to the perceived short and intermediate-term needs;
b) an exploration of issues such as the range of likely users, current database completeness, accuracy, and the adequacy of current standards;
c) recommendations for how any necessary database development efforts should be undertaken, including possible responsible agencies and funding; and
d) recommendations related to database management issues, such as maintenance, integration, and distribution.

Section 5. The Advisory Committee's existence commences when this resolution is passed and concludes one year later. The GIS Steering Committee may extend the duration of the Advisory Committee.

Resolution Creating an Advisory Committee on Hydrology Databases

Nebraska GIS Steering Committee

Whereas: The Nebraska GIS Steering Committee is charged with establishing guidelines and policies for statewide Geographic Information Systems and priority databases, and authorized to establish advisory committees from various levels of government, industry, or the general public pursuant to Sections 81-2604 and 81-2603, R.R.S. 1943.

Whereas: Hydrology databases have been determined to be priority databases for development by the Nebraska GIS Steering Committee,

Whereas: Hydrology databases have been determined by the Federal Geographic Data Committee (FGDC) to be a Framework Database because their use by a wide cross-section of geospatial data users,

Whereas: The Nebraska GIS Steering Committee has communicated to the FGDC its desire to take "a leading role, for the geographic area of Nebraska, in working with the FGDC, and other entities, to facilitate the development of framework geospatial data sets for the geographic area of Nebraska, and to define workable solutions to the proposed roles of Area Integrator, Data Production, and Data Distribution, as they relate to framework data sets for the geographic area of Nebraska."

Whereas: A Database Goal to, "Actively coordinate the development, maintenance, and distribution of priority statewide digital geospatial databases," is one of five long-range goals adopted by the Steering Committee, and discussions related to an Initial Assessment Report have indicated an interest in further development of these databases.

Now Therefore, be it resolved:

Section 1. That the Nebraska GIS Steering Committee creates an Advisory Committee on Hydrologic Databases to study and make recommendations on issues related to the development and maintenance of geospatial hydrology databases for the geographic area of Nebraska.

Section 2. The *(to be determined by participating agencies)* will act as the lead agency to provide the primary support for facilitating the convening, chairing, and provision of administrative support for this Advisory Committee.

Section 3. In formulating its recommendations, the Advisory Committee will solicit either the direct involvement of, or input from agencies and other interest groups that make significant use of these databases, to include at least the following:

Nebr. Dept. of Water Resources	Nebr. Natural Resources Comm.	USGS - Water Resources
USGS - Mid-Cont. Mapping Ctr	Conserv. & Survey Div. - UNL	Nebr. Natural Res. Dist.
Nebr. Dept. of Environ. Quality	Nebr. Game & Parks Comm.	US Fish & Wildlife Service
USDA-Nat. Res. Conserv. Serv.	USDA - Farm Services Agency	US Bureau of Reclamation
US Army Corps or Engineers	US Environ. Protection Agency	Nebr. Emerg. Mgmt. Ag.

Section 4. Pursuant to the objectives outlined in the Database Goal adopted by the GIS Steering Committee this Advisory Committee is charged with reporting to the Steering Committee on the following areas relative to Nebraska geospatial hydrology databases:

a) an assessment of the current status of each designated database, relative to the perceived short and intermediate-term needs;
b) an exploration of issues such as the range of likely users, current database completeness, accuracy, and the adequacy of current standards;
c) recommendations for how any necessary database development efforts should be undertaken, including possible responsible agencies and funding; and
d) recommendations related to database management issues, such as maintenance, integration, and distribution.

Section 5. The Advisory Committee's existence commences when this resolution is passed and concludes one year later. The GIS Steering Committee may extend the duration of the Advisory Committee.

Resolution Creating an Advisory Committee on Land Cover/Land Use Databases

Nebraska GIS Steering Committee

Whereas: The Nebraska GIS Steering Committee is charged with establishing guidelines and policies for statewide Geographic Information Systems and priority databases, and authorized to establish advisory committees from various levels of government, industry, or the general public pursuant to Sections 81-2604 and 81-2603, R.R.S. 1943.

Whereas: Land Cover/Land Use databases have been determined to be a priority databases for development by the Nebraska GIS Steering Committee,

Whereas: A Database Goal to, "Actively coordinate the development, maintenance, and distribution of priority statewide digital geospatial databases," is one of five long-range goals adopted by the Steering Committee, and discussions related to an Initial Assessment Report have indicated an interest in further development of these databases.

Now Therefore, be it resolved:

Section 1. That the Nebraska GIS Steering Committee creates an Advisory Committee on Land Cover/Land Use Databases to study and make recommendations on issues related to the development and maintenance of these geospatial databases for the geographic area of Nebraska.

Section 2. The Conservation and Survey Division - UNL will act as the lead agency to provide the primary support for facilitating the convening, chairing, and provision of administrative support for this Advisory Committee.

Section 3. In formulating its recommendations, the Advisory Committee will solicit either the direct involvement of, or input from agencies and other interest groups that make significant use of these databases, to include at least the following:

Conserv. & Survey Div. - UNL	Nebr. Natural Resources Comm.
Nebr. Dept. of Rev./PTD	Nebr. Dept. of Water Resources
Nebr. Dept. of Environ. Quality	Nebr. Game & Parks Comm.
USDA-Nat. Res. Conserv. Serv.	USGS - Mid-Cont. Mapping Ctr
Nebr. Natural Res. Districts	Local Government Representatives

Section 4. Pursuant to the objectives outlined in the Database Goal adopted by the GIS Steering Committee this Advisory Committee is charged with reporting to the Steering Committee on the following areas relative to Nebraska geospatial land cover/land use databases:

a) an assessment of the current status of each designated database, relative to the perceived short and intermediate-term needs;
b) an exploration of issues such as the range of likely users, current database completeness, accuracy, and the adequacy of current standards;
c) recommendations for how any necessary database development efforts should be undertaken, including possible responsible agencies and funding; and
d) recommendations related to database management issues, such as maintenance, integration, and distribution.

Section 5. The Advisory Committee's existence commences when this resolution is passed and concludes one year later. The GIS Steering Committee may extend the duration of the Advisory Committee.